

FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1925	
May 8	.... Capt. W. H. Sayers, Hons. Member: "A Résumé of Achievements in Aviation during the Past Year," before I.Ae.E.
May 20	.... Visit to the National Physical Laboratory, Teddington, by I.Ae.E.
May 21	.... Aero Golfing Soc. Match, Cassiobury Park.
May 28	.... R.A.F. Middle East Dinner.
May 29	.... Aero Golfing Soc. Match, Oxhey.
June	.... Race Meeting at Hendon Aerodrome.
June 6	.... Visit to Croydon Aerodrome, by I.Ae.E.
June 7	.... Gordon Bennett Balloon Race, Brussels.
June 25	.... Aero Golfing Soc. Match, Mid-Surrey.
June 27	.... Royal Air Force Display, Hendon.
June 27	.... R.A.F. Iraq Dinner, Holborn Restaurant, at 8.15 p.m.
July 3-4	.... King's Cup Race.
July 26-Aug. 9	.... Vauville Light 'Plane and Glider Meeting.
Sept. 19-28	.... F.I.A. Conference at Prague.
Oct. 8	.... Aero Golfing Soc. Autumn Meeting, Walton Heath.
Oct. 24-29	.... Schneider Cup Race, Baltimore, U.S.A.
1926	
Aug.	.... Light Aeroplane Competition.

EDITORIAL COMMENT.



DO not want you to think that I look upon the Air as a blessing altogether. It may be more of a blessing for this Empire than for any other country in the world, but I feel that all the good it will do in civil life cannot balance the harm that may be done in war by it, and, if I had the casting vote, I would say 'abolish the Air.' I feel it is an infinitely more harmful weapon of war than any other, and it is a terrifically powerful weapon, and, therefore, though my remarks tonight will touch on technical and civil aspects, they will necessarily deal with the service aspect of this great question."

This statement, made by the Chief of the Air Staff, Air Chief-Marshal Sir Hugh Trenchard, in his address to the Cambridge University on Wednesday of last week, must give food for thought to anyone more than superficially interested in the welfare of the British Empire. It shows the importance which Sir Hugh Trenchard attaches to the question of air armament, and who should be in a better position to judge than he? He has seen "the Air" grow, from a couple of machines taking part in some early Army manoeuvres, to the Royal Air Force as it was at the end of the War 1914-18, and he was personally responsible for creating the R.A.F. out of a relatively small nucleus. If, therefore, Sir Hugh regards the Air Arm, not only of this but of every country, as a "terrifically powerful weapon," it behoves those who have not studied the subject from quite the same angle, and who have certainly not had the opportunity of studying it from within, as has Sir Hugh, to attach the very greatest importance to his remarks. How strongly he feels on the subject is shown by his remarks that if it rested with him he would "abolish the air."

We doubt if the Chief of any great Service has ever spoken more plainly, more sincerely, and with greater conviction than did Sir Hugh Trenchard at Cambridge, and for this reason, although we could ill afford the space, we have published very long extracts from his address. If one accepts Sir Hugh's

view, and it is difficult to see how one could help accepting at least its broad and fundamental outlines, the question that naturally arises is, do we, do our politicians, does the nation itself, realise the vital importance of keeping to the forefront in matters relating to the air? Frankly, we doubt it. And that is why we think Sir Hugh Trenchard's forceful remarks and concise statement of the fundamental requirements are of such exceptional importance.

It should be observed that Sir Hugh did not in any way touch upon the subject of comparative strength in the air as between one nation and another, nor did he draw comparisons between our flying equipment and that of other nations. He confined himself to outlining the basic principles upon which our Air Arm must work, and he attached so much importance to that Air Arm that he would be willing, were such a thing feasible, to "abolish the air." He did not even hint at the possibility or otherwise of doing away with all air forces. That may have been because he did not think the contemplation of such a course worth bothering about, or it may have been because he regarded it as being outside his province. In any case, we think very few sane people will seriously believe that within a measurable period the abolition of air force, or of any other armed force, will become a practical proposition, attractive as it sounds in theory. That much being agreed, the necessary corollary is an examination of how we stand as regards air development. Upon that subject Sir Hugh did not, as we have said, touch at all, but his whole paper must inevitably lead up to it, and it appears to us that at the moment one can only arrive at the result that so far this country as a whole has not fully realised the seriousness of the situation. As the years go by, it is obvious we must of necessity devote a larger and larger proportion of the sums spent on defence to the development of the air, and in order to make this possible it is, as Sir Hugh pointed out, essential that a knowledge of and interest in the air be inculcated into the whole population.

"It is," Sir Hugh said, "up to me and my colleagues at the Air Ministry to do all in our power to assist in educating the general public in this respect so as to induce the best material to come forward into the Air Force. I am convinced that one of the most important means by which this may be achieved is through the great seats of learning, the universities, who are turning out into the world the young men of the country who will have such a great influence on its future."

The proposed establishment of University Air Force Squadrons to which Sir Hugh referred is, it seems to us, an excellent step in the right direction, and should do a tremendous amount of good, since, if we can get our universities and public schools really interested in aviation, a great step forward will undoubtedly have been taken. To do this will, as stated by Professor Inglis, in his remarks following the reading of Sir Hugh Trenchard's address, require a certain amount of goodwill on the part of the University authorities, but Professor Inglis also expressed the belief that this goodwill would be forthcoming.

Concerning most of the statements and references made by Sir Hugh Trenchard, there seems little need for comment, but one or two points deserve, we think, to be underlined, and not a few of them ought to become accepted as fundamental principles.

For instance, the truth of Sir Hugh's statement of the importance of breaking down the morale of your enemy, and the fact that that can only be done by attack, is fundamental, and has, of course, been expressed in the sentence that "the best form of defence is attack." The statement of the distinguished speaker that the aeroplane is a bad weapon of defence, but that it is the only effective weapon of defence so far discovered, is also worthy of notice. Sir Hugh's remarks concerning wastage and replacements are illuminating, and particularly would we call attention to his reply to the question: "Why not keep sufficient reserves to carry us on until the normal trade could put forth sufficient machines to make up for our losses?" That reply was that if one kept six months' wastage at war rates, most machines would die of old age without every having been flown, and the waste of money would be gigantic.

The lecturer's remarks concerning Empire defence should be carefully read by all interested in the future of the British Empire, and Sir Hugh was equally interesting when he ventured to prophesy as to future developments. We wonder how many will seriously dispute his statement—except perhaps to lessen the period—that "in another 50 or 100 years the British Empire will have to be defended by air, as the only practical method of doing it on an economical and efficient basis." The point made by Sir Hugh, that the present development of the air may be compared with that of gunnery prior to the South African War, was a telling one, and lent force to the opinion expressed, that with improved bomb sights the accuracy of bombing will be bound to be greater than that of gunfire at 40,000 yards.

A timely word of warning was uttered by the Air Chief in connection with the subject of accidents. While he agreed that accidents could, and doubtless would, be reduced by improvements in machines and equipment, he thought that when all had been done to effect improvements, there would still be accidents, owing to the human element. By human error, Sir Hugh pointed out, he did not mean human incompetence, and the more flying pilots did, the more competent they would become, and the less chance there would be of accident. "But," the Air Chief said, and we think this is a fundamental truth and one well stated, "*although human errors may be to a large extent counteracted by improvements in design, I believe that the actual standard of human error will remain constant for all time.*"

In this connection it should be recollected that Sir Hugh was speaking of service accidents, which are essentially different from civil flying accidents. In the R.A.F., evolutions have to be carried out by machines, singly or in squadron formation, which no commercial aeroplane is ever called upon to perform, and in the very nature of things service flying must be in many respects more risky than commercial flying. At the same time, there can, we think, be no doubt that Sir Hugh was correct in his estimate of the permanence of the human error factor, and it would be unwise to close our eyes to the fact. Nor, if we know them at all, will the slight risk act as a deterrent to our young men.

One could go on quoting the Air Chief, but we think that the passages to which we have referred will suffice to cause our readers to peruse the extracts published elsewhere in this issue. They will, we are sure, find never a dull line in the whole three pages.

THE BLACKBURN TWIN-FLOAT SEAPLANE

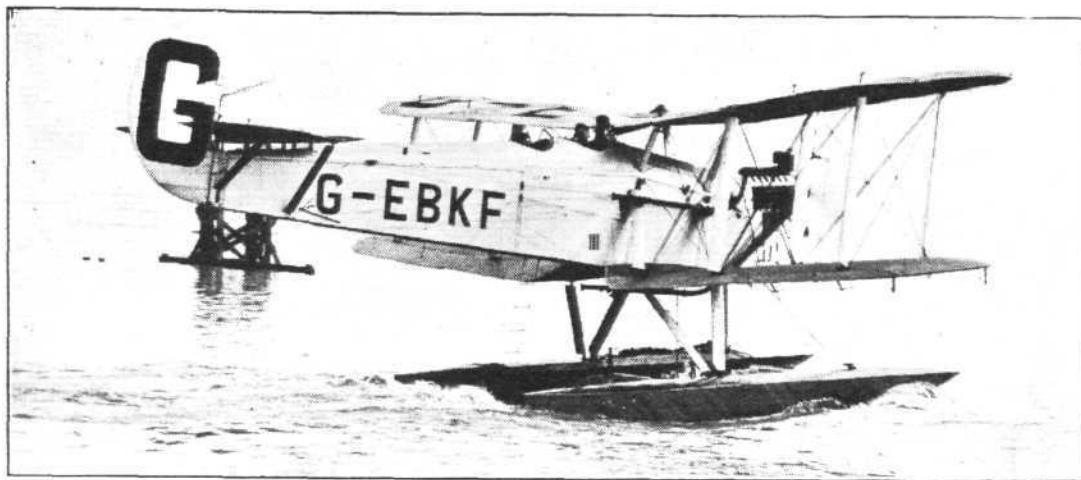
Napier "Lion" Engine

In our issue of April 16, 1925, we published a number of photographs of the new Blackburn twin-float seaplane used at the Blackburn flying school at Brough. This machine is a development of the Blackburn "Dart" torpedo-plane, to which it has a strong family resemblance, and it is thought

purposes in the ordinary "Dart," and they have been retained in the seaplane.

Although not shown in the general arrangement drawings, the "Dart" seaplane is equipped, for school work, with landing wheels which form a permanent part of the equipment,

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○
○ The Blackburn
○ "Dart" Sea-
○ plane: The
○ machine just
○ leaving the slip-
○ way, the wheels
○ not yet having
○ been raised.
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that a slightly more detailed description may be of interest to our readers.

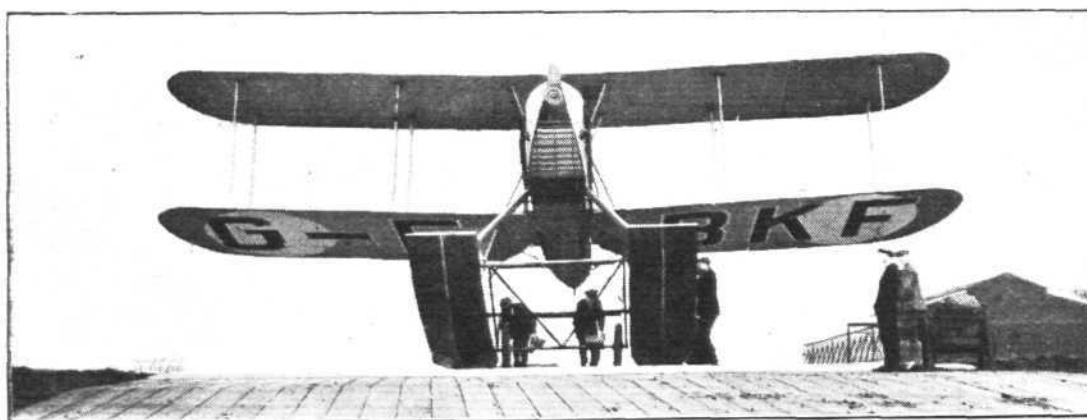
The Blackburn "Dart" seaplane has been designed as a dual-control school machine for more advanced pupils, and the fact that it is almost identical with the service machines which pilots will be called upon to fly should make it a very valuable part of the Brough equipment. At the same time, the machine can, of course, be used for other than school work, as its high-power engine naturally enables it to carry quite a considerable load.

In general design the "Dart" seaplane is a tractor biplane with two floats of boat-built construction extending aft sufficiently far to do away with the need for a tail float. The recent demonstrations at Brough showed that the machine gets on to its step very easily and that it is particularly "clean" in running, while showing no tendency to "porpoise." In fact, it is claimed that the machine is so well trimmed at taking-off speed that the pilot can take his

in that they are not dropped on taking the water. These wheels are not, however, intended as an amphibian gear in the ordinary sense of the word, and the machine is not designed to alight on land, the wheels merely being a form of trolley on which the machine is transported down the slipway into the sea, and back again on its return from a flight. It would appear that with very little modification, and not a great increase in weight, the trolley gear might be elaborated and extended to turn the "Dart" seaplane into an amphibian.

The fairly small wings, the use of a medium-lift section (T. 64), and the general concentration of all heavy weights were, of course, results of considerations connected with the original machine, but are found no less useful for school work, the more so as the general behaviour of the seaplane is more or less identical with that of the torpedo-plane.

Constructionally the "Dart" seaplane follows standard Blackburn lines in that it has wood wing structure and partly

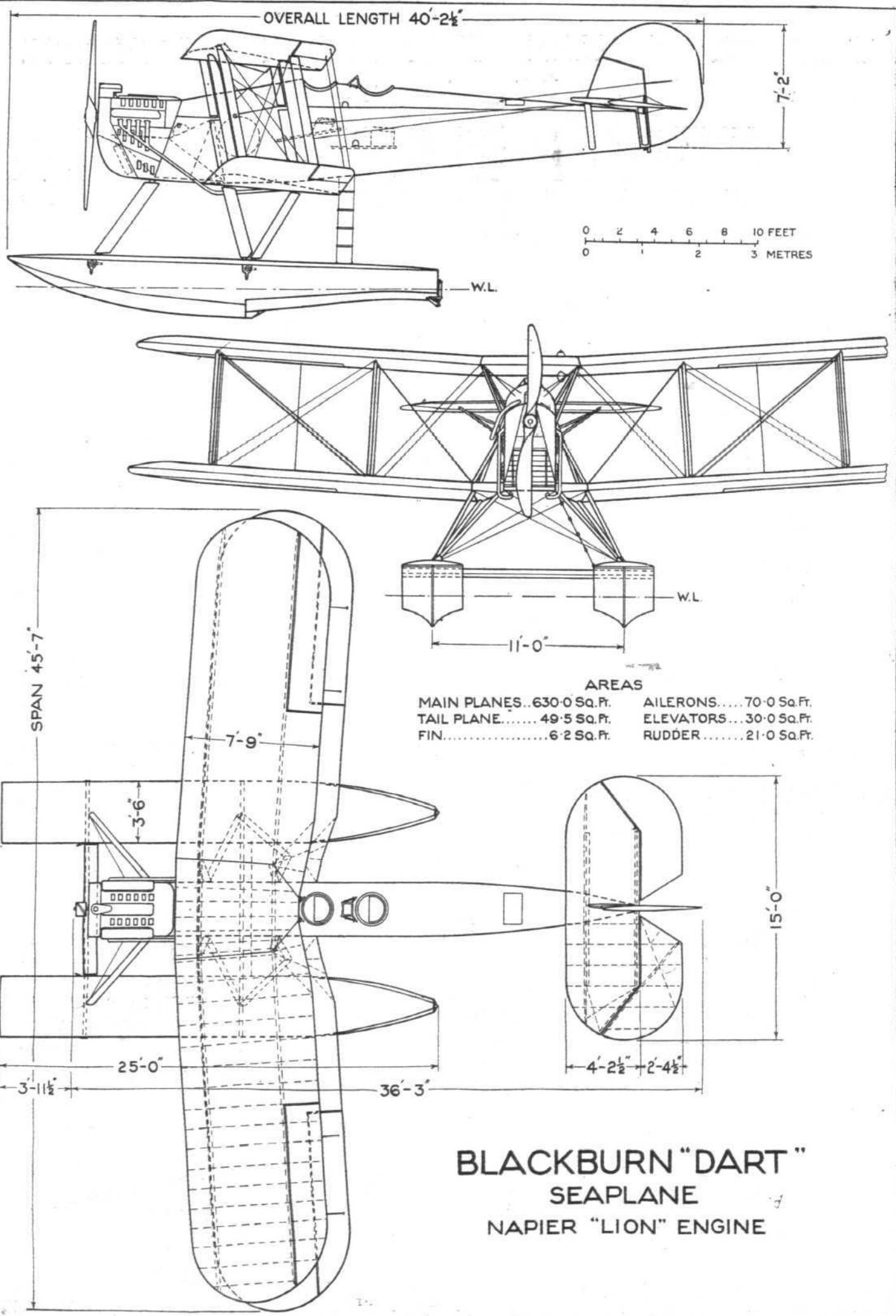


hands off the controls. The float volume is ample for the weight of the machine, so that not only would one float be sufficient for keeping the machine from sinking in case of puncture of the other, but the seaworthiness is, naturally, greatly increased. As regards general design, perhaps the only slightly unusual feature is the back-swept wings, which, although very popular in the early days of flying as a means of obtaining stability, are not so frequently seen on modern machines, and when they are, the object is usually connected with questions of fore-and-aft trim for a given disposition of main loads rather than with aerodynamic stability. The somewhat unusual lines of the fuselage are, of course, connected with the object of good visibility for deck-landing

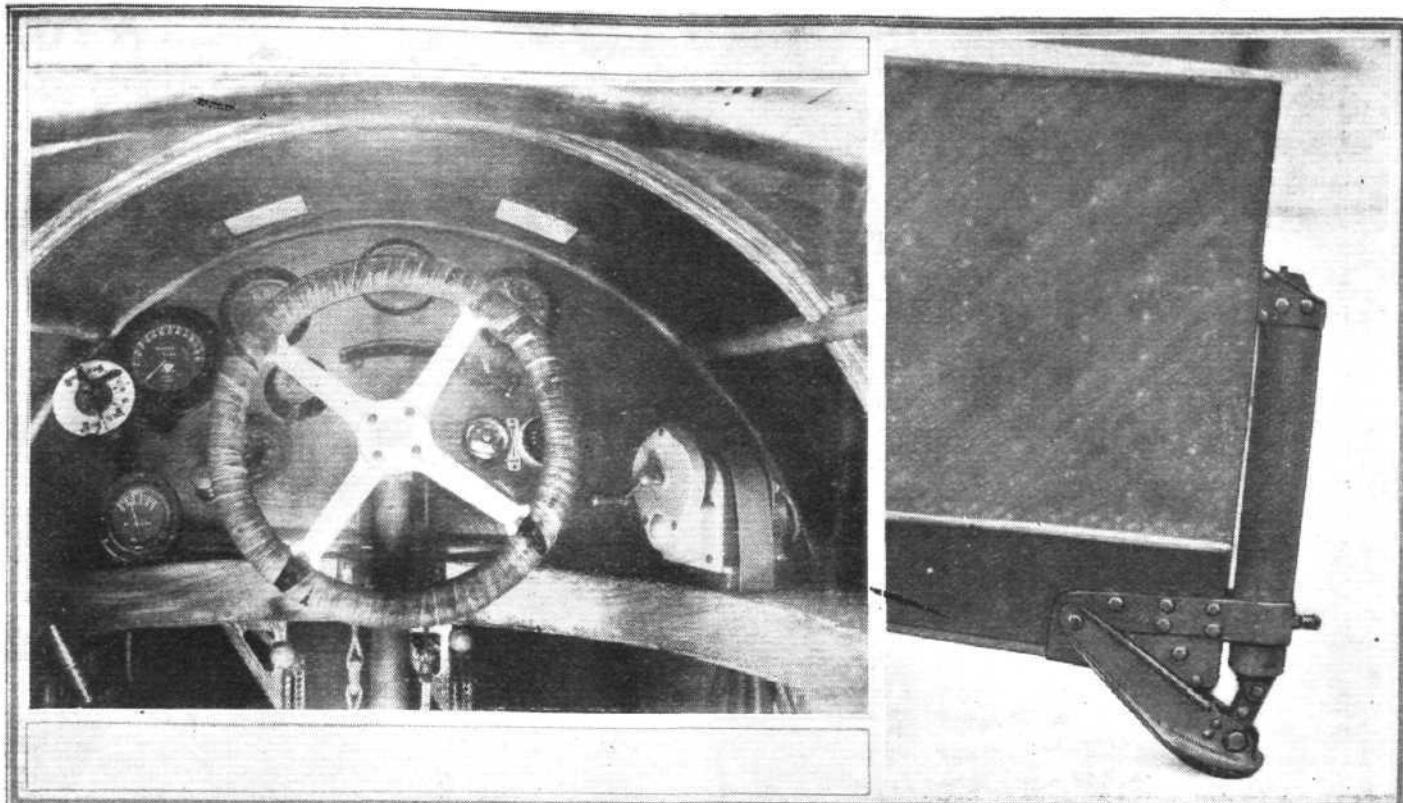
wood and partly metal fuselage. The latter is built in three sections: the engine mounting with cowling, etc., shown in a set of photographs; the fuselage centre portion, taking the cockpits, undercarriage attachments, etc., and the tail portion. The first two sections are of steel-tube construction, while the rear part of the fuselage is the usual wood-girder structure braced with tie-rods.

Some of the accompanying photographs show the steel-tube centre section of the fuselage and some of its details. The fittings, it should be pointed out, are machined from the solid, and have been so designed that all struts and wires meet on the centre lines, or neutral axes, thus avoiding off-set moments. The Blackburn designers consider this arrange-

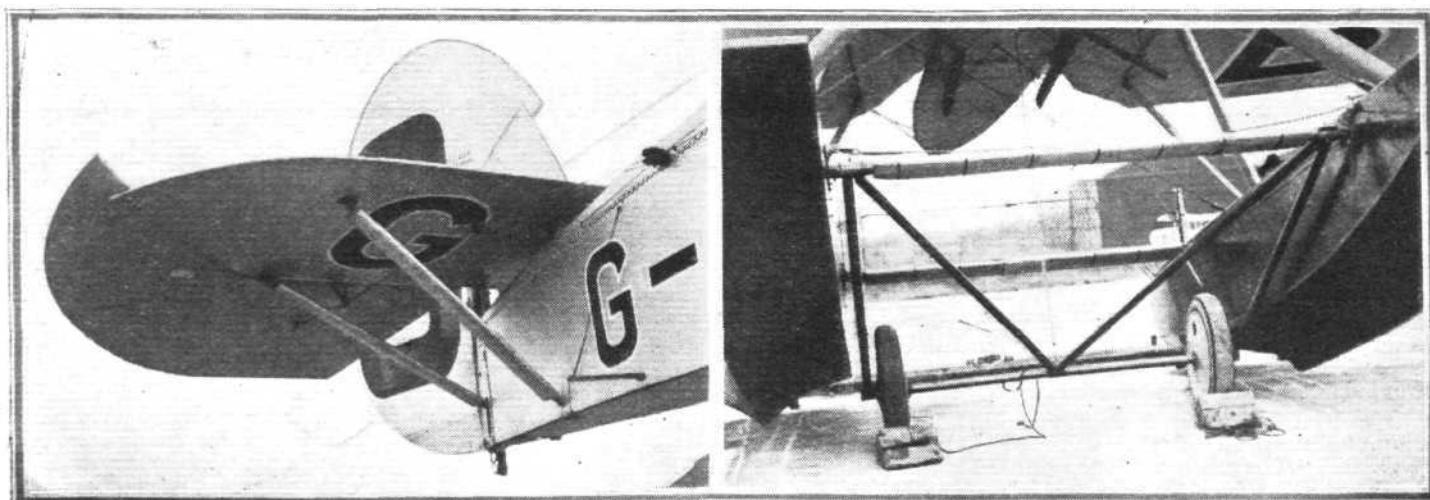
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○ The Blackburn
○ "Dart" Sea-
○ plane: Front
○ view of the
○ machine at the
○ top of the slip-
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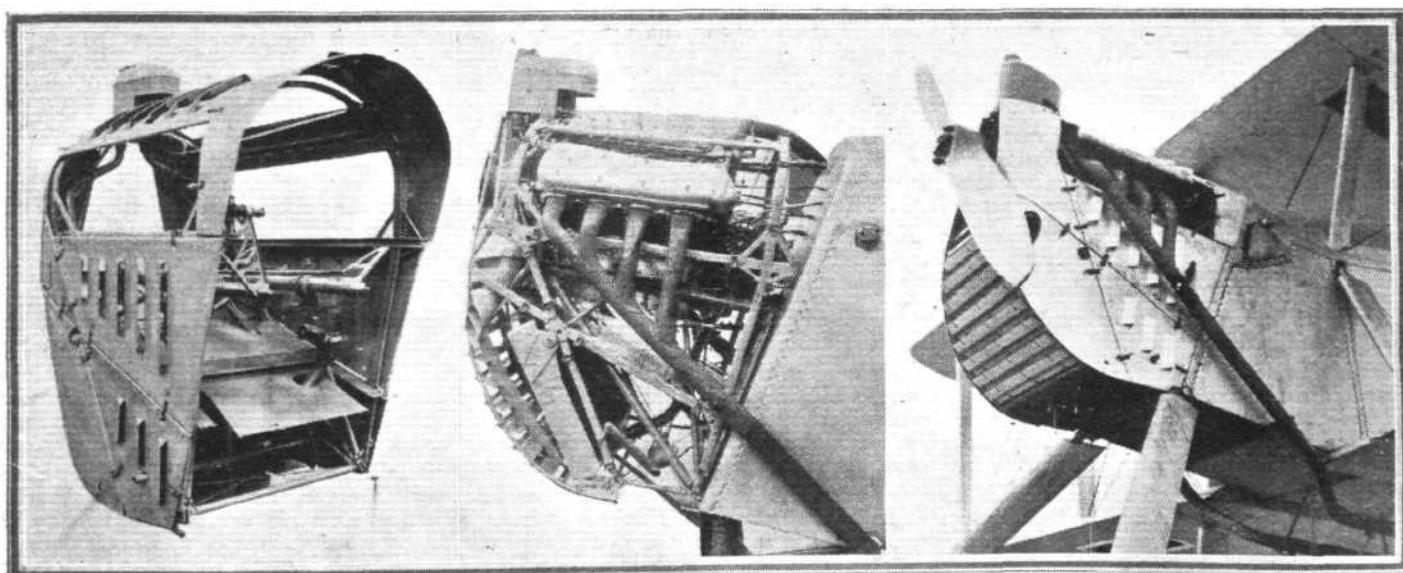
THE BLACKBURN "DART" SEAPLANE: General Arrangement Drawings, to Scale.



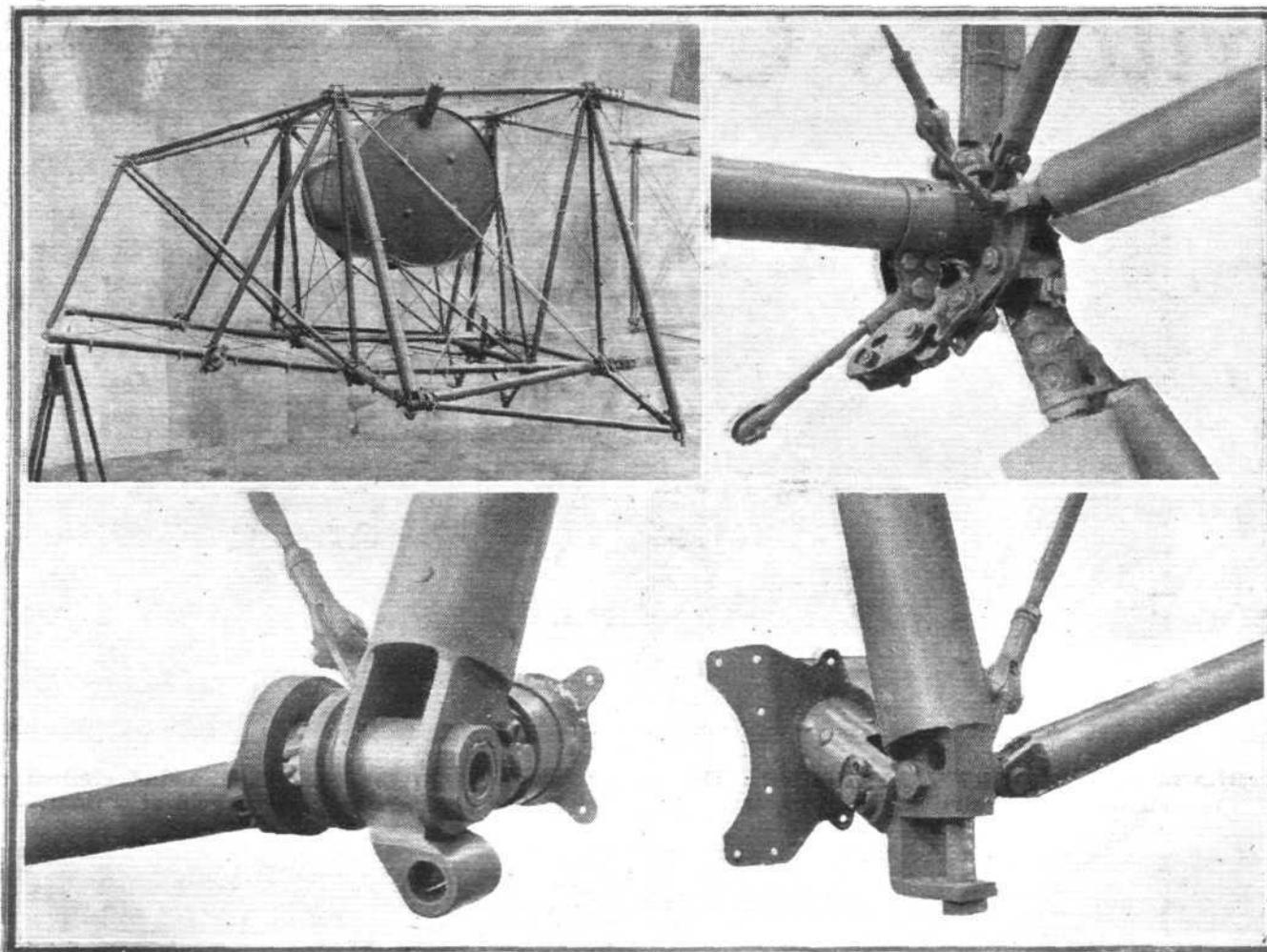
THE BLACKBURN "DART" SEAPLANE : On the left a view into the cockpit, showing control wheel instrument-board, starting magneto, etc. On the right the sprung skid on the heel of a float.



THE BLACKBURN "DART" SEAPLANE : On the left the tail, with balanced rudder and elevator. On the right the trolley, and its framework. This trolley is raised clear of the water as soon as the machine is afloat.



THE BLACKBURN "DART" SEAPLANE : Three views of the engine housing, engine mounting, and complete nose. The engine is a Napier "Lion."



THE BLACKBURN "DART" SEAPLANE: Some constructional features. In the upper left-hand corner is a view of the steel tube centre portion of the fuselage. Note the system of triangulation, and the main petrol tank. The other photographs show typical fittings, machined from the solid.

ment superior to the older method of transmitting heavy concentrated loads through timber members with lugs, plates, and bolts. This centre section of the fuselage forms, in fact, a sort of rigid backbone of perfectly triangulated construction, to which all other members are attached, and to which all the heavier stresses are transmitted.

The wings, as already pointed out, are of wood construction, with spars spindled out from the solid to form an I-section. The ribs are also of wood, but the wing covering is the usual doped fabric. The interplane struts, however, are in the form of steel tubes with wood fairings. The wings are designed to fold, and the hinges for this (on the rear spars), as well as the locking devices on the front spars, are shown in our photographs.

The engine mounting is tubular, as regards the main supporting structure, with subsidiary channel-section frames carrying the cowling, etc. The three photographs give a good idea of the structure, as well as of the cowling and general arrangement. The petrol tank is mounted inside the fuselage, aft of the fireproof bulkhead, and is situated approximately on the centre of gravity of the machine, so that the trim is not altered as the fuel is consumed. The main tank supplies petrol to a Vickers pump placed below the tank to ensure constant flooding. The supply is carried up to a

three-way cock, one branch of which supplies the carburettors, the other being connected to the gravity tank, and a separate pipe being run from the hand petrol pump to the gravity tank. The gravity or service tank is placed in the top centre section, in which position it gives a "head" of at least 24 ins. when the tail is on the ground.

The two floats are built of two skins of mahogany, placed at an angle to one another, and are of the single-step type. They have Vee bottoms both ahead and aft of the step, and the heel of each float terminates in a sprung skid, which takes the place of the usual fuselage tail skid in the land machines. The two floats are placed a considerable distance apart, so that the machine is very stable on the water, the strut attachments being partly direct to the fuselage and partly to the lower plane at the point of attachment of the sloping outrigger struts. The hinges for folding the wings, incidentally, occur at this point also.

The main dimensions are as shown on the page of general-arrangement drawings. No detailed performance figures are available, but we understand that the top speed of the "Dart" seaplane is about 87 knots (100 m.p.h.), and the rate of climb at sea level is approximately 600 ft./min. The general design and workmanship is, as in all Blackburn products, of a very high order.



Death of M. Clement Ader

It seems only the other day—it was last October, as a matter of fact—that we recorded in FLIGHT the celebration at Muret (Haute Garonne) of the 83rd birthday of M. Clement Ader—the "Father of Aviation." Now we regret to announce the death of this pioneer, which took place on May 3 at Muret, the town of his birth. Having made a very close study of bird-flight, Ader, in 1886, started on the construction of a flying machine, which was completed after four years' hard work. Its trials were carried out in secret, but it is not known if the "Eole," as it was called, actually flew. Another machine was built a year later, but this was wrecked during its trials at Satory. Then in 1897 Ader built his famous "Avion"—a curious bat-winged monoplane with twin

airscrews driven by a steam engine. On October 14 that year, in the presence of representatives of the French Ministry of War, the "Avion" was claimed to have accomplished a flight of 437 yds. He offered his plans to the Government, but they were not convinced and refused the offer. Bitterly disappointed, after years of hard work, Ader destroyed the machine and his plans, and went into retirement at Muret. During the last few years, however, his early work has received some recognition, and last year—rather late in the day perhaps—he was made a Commander of the Legion of Honour. Just recently he had the misfortune to lose his wife—his life-long companion—and this loss seems to have hastened his end. What remains of the "Avion" is preserved in the Musée des Arts et Métiers. A tragedy, indeed.

THE AIR DEFENCES OF GREAT BRITAIN

Sir Hugh Trenchard's Address at Cambridge University

THE address delivered by the Chief of the Air Staff, Air Chief Marshal Sir Hugh Trenchard, G.C.B., D.S.O., A.D.C., before the Cambridge University, on April 29, was an extremely important one, and had space permitted, we should very much have liked to publish the address in full. This has not, however, been possible, but it is hoped that the extracts given in the following do not omit any vital point made by the distinguished lecturer.

The President of the Union (Mr. G. Sparrow) occupied the chair, and the audience included Sir Geoffrey Butler, M.P., Parliamentary Secretary to the Secretary of State for Air, General Costello, President of the Board of Military Studies, Professor C. E. Inglis, and Professor B. Melville Jones. Following are extracts of Sir Hugh's address:—

"I do not want you to think that I look upon the air as a blessing altogether. It may be more of a blessing for this Empire than for any other country in the world, but I feel that all the good it will do in civil life cannot balance the harm that may be done in war by it and, if I had the casting vote, I would say 'abolish the air.' I feel it is an infinitely more harmful weapon of war than any other and it is a terrifically powerful weapon, and therefore though my remarks to-night will touch on technical and civil aspects, they will necessarily deal with the service aspect of this great question."

Division of the Royal Air Force

Sir Hugh Trenchard then briefly outlined the divisions of the R.A.F., pointing out the three main parts: The section responsible for defence against aerial invasion, and which is, in turn, divided into two sub-divisions—Home Defence and Defence of the Empire as a whole, the Fleet Air Arm, working with the Navy, and the Army-Co-operation Squadrons, working with the Army. Dealing first with Home Defence, Sir Hugh continued:

Home Defence of the Empire

"The Air Force for the defence of these islands is divided into fighting squadrons, which are at present single-seaters and will probably remain so. These are used for protective purposes and attack any enemy which attempts an aerial invasion of this country. Then there are the day bombers and night bombers. These are the offensive aeroplanes. I would now like to say that I have sometimes been asked why we don't use only defensive aeroplanes. My answer is that if you play a game of football against an opposing team, I take it your objective is to win. If the opposing team commence to attack and the members of your team are told only to defend their own goal, they could not possibly win the match, and it is quite conceivable they would lose it. Equally, if all your team were told to attack and not to defend, one of the opposition might get a run through and, if he did, he would find an open goal. A certain number of defensive squadrons are necessary for the morale of our own people. Nothing is more annoying than to be attacked by a weapon which you have no means of hitting back at, but, although it is necessary to have some defence in order to keep up the morale of your own people, it is infinitely more necessary to lower the morale of the people against you, as nothing else can finish the war, and that can only be done by attacking them wherever they may be."

"*The Aeroplane as a weapon of defence.*—There is one point that I would like to emphasise here, though this may not be the right place for it. I would like to say that the aeroplane is the most offensive weapon that has ever been invented. It is a shockingly bad weapon of defence, but it is the only defensive weapon against the aeroplane that has yet been discovered, and even in these days of great scientific improvements and inventions, I have grave doubts that any other weapon will take its place for another hundred years, if then, though the possibility of this must be looked into continually."

"*Replacements.*—Before I leave the subject of Home Defence I will touch on another aspect of it which affects you more closely. In the event of war, which I hope will not take place again in our time, and a war in which this country is seriously attacked by an air power, the great problem to be faced is that in the first clash of the opposing forces the casualties will be very, very high, and the question of replacing the reserves will be very difficult. In fact, they will be almost insuperable, not only for this nation, but for any other nation. Let me explain. Supposing the two forces consisted of—let us take the figure of something like 100 aeroplanes on each side. Within a month this figure would drop to something like 20, or even 10 aeroplanes. How are the

casualties to be replaced? For the first month you will have your reserves, both pilots and machines, but beyond that there will be no reserve that I can see—at any rate, that are fit to take the field at once—and the two opposing armies will go on fighting each other on the basis of 20 machines a side instead of 100. From this you will see that whichever side can re-equip first both in pilots and machines and get back to the original number of 100 machines will probably win the war. That is where you come in. The brains here must so conceive and develop machines that the output after the war has begun can be rapidly increased from what it is at present, and if this is going to be done on an economical basis, then the construction of the machines and engines must be made more simple and easy to carry out. Some of your minds in the future must be applied to that. It may be that you will ask, 'Why should we not keep sufficient reserve to carry us on until the normal trade could put forth sufficient machines to make up for our losses?' The answer to this is that in peace the wastage is 30 per cent. per annum, while in war it is in the neighbourhood of 80 per cent. per month. You can, therefore, see that if you kept six months' wastage at war rate most of the machines would die of old age without ever having flown, and the waste of money would be gigantic and, in my opinion, crippling. Pilots are not quite so difficult, but there is difficulty in that direction too. Another place where you come in, which I will refer to at the end, is in the Air Force squadron which I hope will be formed at Cambridge, so that some of your successors at this great university will be ready and able to take their place if this country is ever called upon to face an attack from the air."

The Auxiliary Air Force

"Now there is one interesting innovation we have made in the Air Service with regard to Home defence. We feel very much indeed the importance of trying to get the nation intimately connected with the air service for Home defence, and we feel that all good men of the different types—the pilot, the engineer, the dashing motor driver, the literary man and the scientific man—which so largely predominate in the English public, all could be of use in the defence of this country. We therefore decided to start in the Home Defence squadrons six Auxiliary Air Force squadrons and seven Special Reserve squadrons.

"What we call the Auxiliary Air Force squadron is on the lines of what is familiar to you as the Territorials: that is, a whole unit is raised by an area or a county with a small nucleus of regular Air Force personnel, consisting of an adjutant and a number of good tradesmen. These squadrons will be run by the county associations just outside some great industrial centre or large town, and thus would bring flying close to that town and enable the inhabitants to come and see it. I also hope that a good man who is working on a bench in a factory will be able to walk across to another bench in the Air Force unit, and, if we get a really good man, within a few hours he should learn the work he has to do in the Royal Air Force. My experience in the last war proved that this was possible and, indeed, quite practicable. Let me tell you of one amongst many mistakes I made—one that happened to turn out to be a great success. A very skilful fitter came to join up in 1914 when I was at Farnborough, and so I agreed to take him on. The next morning I saw a man who I took to be a rigger. I told him to rig a Henry Farman which was lying in parts on the ground. I gave him a 'Blue print' which showed the aeroplane rigged to scale. The man got to work and rigged the machine, and in a few days it flew fairly successfully several times."

"Later I found out that the man who I had thought to be the rigger was my newly joined fitter, who knew nothing about rigging but was able to read a 'Blue print,' and so managed to do the work which I had set him."

"Of course, he was an exceptional case. I will tell you of another case. I had two new types of engines sent me, and I also had two men fresh from civil life. I told them that the engines would not work and that I wanted them to make them run. Within a few hours both engines were running. Both these cases show that men from civil life can come straight into the Air Force and take their place."

The Special Reserve

"The special reserve squadrons are to be much the same as the auxiliary air force squadrons—that is to say, they will be located near an industrial centre, but they will be a little more

like regular air force squadrons in so far as they will consist of three flights, one flight being composed entirely of regular air force personnel, the other two flights being recruited locally. They will, moreover, be under the same control as a regular unit and not under the county association.

"In some ways this will resemble the Special Reserve as it was in the Army before the war, but it is not intended that the Special Reservists should necessarily do any annual training. I hope that the personnel will be very highly skilled tradesmen who, with the small amount of training they will be required to do from time to time, will keep themselves efficient and able to take their place should they be required for the defence of this country. As with the auxiliary Air Force, I hope the greatest local interest and pride will be taken in them. I hope that we shall be starting some of these squadrons this year, though we have been delayed by the difficulty of obtaining suitable grounds.

"The squadrons which will, I hope, be started this year will be located as follows:—

"Two at Northolt (which will be under the City of London and the County of London).

"One at Renfrew, near Glasgow.

"One at Turnhouse, near Edinburgh.

"One at Aldergrove, near Belfast.

"One at Waddington (Lincoln).

"This accounts for six. It leaves seven more. I cannot at present give you the location of the remaining ones as it has not been definitely decided yet, but they will be scattered about at suitable places. I hope that all present who happen to be in those parts of the country where these units are to be formed will do their best whether to join one of these squadrons or influence their friends to join and help to make it a success.

"Remember that if we get the best and, in the future, if it is looked upon as much of an honour to belong to one of these auxiliary Air Force squadrons as it is to belong to a good club or a good university, so will it be a great means of enabling the spirit of aviation to be spread throughout the country for civil purposes and for service purposes. It will also give all the brains of the country a chance of being used for aeronautical purposes which will be an important factor in home defence.

Empire Defence

"The air defence of this Empire. What is really the meaning of the word 'Empire'? I defined it recently as our territories and our trade. What asset has our trade? Is it not our outlying territories and their ports? Is it not one of the great assets to our trade that we have friendly ports not only where the trade can come from but where it can also go into for refuge from an enemy or from weather or for supplies? I therefore look upon these territories, anyhow those in the eastern hemisphere, as a great asset. Take the map of the world and look at it, especially that part from the west of Ireland to the east of Newfoundland. I look upon it as the greatest asset to the Air Service of this Empire, and this Empire alone is peculiarly situated to employ its air to its maximum. If there were aerodromes suitably arranged and built, even though they cost a few millions, it would save in expenditure. You need not tie air squadrons in every spot of the British Empire to defend it, and so long as you have these facilities and arrangements the actual unit becomes very mobile and will be a thousand times still more mobile when the great aircraft carriers of the future—the airships—come into being. Let me say now that, so far as I am concerned, the great problems of the world are economic, and I say that if the Air Force cannot carry out the defence of the Empire, anyhow in parts of the Empire, as cheaply or more cheaply and as efficiently as the older services have done for hundreds of years past, then there is no justification for using it. But if, as I claim, it can carry out the defence of many parts of the Empire more economically and as efficiently as the other services, then what chances are opened up with our Empire situated as it is?

"In this connection, I feel that one of the great principles which I have striven to keep to is that every pilot must understand his engine and aeroplane, and though for years after the war it was difficult to get sufficient education, I feel that in another five or ten years' time, every pilot, flight lieutenant and squadron leader will know enough about his engine, machines and accessories to keep them in running order and find out the trouble when anything goes wrong.

"I would ask you to look at what has happened in Iraq, which was formerly called Mesopotamia, where we really have reduced expenditure from many millions to three or four millions and with less casualties to our own people than before and also with less casualties to the enemy. I therefore claim for the air that it is a humane weapon. I look upon it as most humane in running countries like Iraq where,

perhaps, six aeroplanes can go out at once and deal with a truculent tribe.

"Another way the air avoids making war is that if a hundred of you are killed all your relatives would be very bitter and some will vow revenge. This is a greater weight on the side of war than if only ten of you were killed. Another thing is that the air does not live on the country and eat up the country.

"In India, the air is increasingly proving its value, and tribes are coming in and making their submission for wrong-doing, which in the past had meant punitive columns with vast expenditure in money and lives.

"All the foregoing has been on the effect of air on a power with no air. This is a different problem to the use of air power on a nation that is an air power. In fact it is entirely different. So far I have only touched on the use of air power in the defence of the Empire. Now what about the use of air power with regard to the defence of our territories and trade in the eastern hemisphere from aggression. If you will study the trade routes of the world you will see the number of places they go into and how close they run to the shore in many parts. You know the submarine brought us to the verge of disaster in the last war by attacking our trade near our ports or near shore. The aeroplane was a good weapon against the submarine. Merchant ships under the convoy of the air in the narrow waters close to the shore are less vulnerable to submarine attack than they are farther out. Though no doubt the navy have their part to play, I am asking you to think whether the British Empire does not lend itself to the protection of our trade in many parts of the world and also for attacking, if necessary, anyone else's trade. As you can see for yourselves, nearly all the naval battles of the past have been fought close to the shore for obvious reasons. In fact I do not think that any have been fought 100 miles out for the past 250 years. What will be the effect of the air with regard to this? I ask you to think. To turn to the Air Defence of the territories of the Empire. In the past we have had fixed defences. Great guns have been installed and now the guns are still greater and can only fire blindly unless they have an aeroplane to observe. A ship that bombards is hull down to the port it bombards, therefore, without the aeroplane the shore batteries cannot shoot at the ship, and what is easier than when that aeroplane goes out to see where the ship is for the ship to steam out of range until the aeroplane has to go back or else it calls upon its own gun to open fire as a counter bombardment; but this does not stop the bombardment. Is it not possible to attack with the aeroplane? It may not sink, but it may damage ships 250 miles out and so prevent bombardment instead of using counter bombardment. Even so, I don't want you to think the air will prevent all bombardment, but it will act as a great deterrent and a very economical one when the aeroplane can go from one port to another.

Future Development of Defences

"Now, I have spent perhaps too much time on that side of the question, and I would like to conclude it by saying that it seems to me, in another 50 or 100 years the British Empire will have to be defended by air, as the only practical method of doing it on an economical and efficient basis. When you think of the cost of the few squadrons necessary for such a defence, as against the cost of any other means, and when you think of the percentage of hits by torpedo and bombing machines is far in excess even now in its infancy than the percentage of hits by any other means, is the assumption I have just made likely to be wide of the mark? The present development of the air may be compared with that of gunnery prior to the South African War. In another 10 or 15 years, when we have vastly improved bomb sights, what may be the accuracy of bombing? Is it not bound to be more accurate than a gun firing at 40,000 yards, when an aeroplane can drop its bomb straight on to the target from perhaps 10,000 ft.? Consider all the mechanical errors of the gun, the atmospheric conditions, the necessity for observation, and I will leave it to you yourselves to decide which method is likely to become the most accurate.

"I must touch on another side of the air in connection with the Service which, as you will see for yourselves, has its reactions on this university, and in fact on the nation as a whole, and that is the subject of strain. I feel that in the future, if war ever comes again, the defence of these islands will not lie entirely, or even principally, in either the hands of the Air, the Navy, or the Army. It will lie just as much in your hands, and in those of the people who have to run the vital services of the country. What is the good of the most perfect air weapon to defend the country and to fight if the vital services of the country are vulnerable to enemy attack and are liable to be paralysed without the means of repairing

them and keeping them going. In other words, if the nation is disorganised and beaten, what is the use of the fighting forces being still intact? I, for one, shall always advocate that the first claim on the resources of this nation at the beginning of a war in which air will attempt to attack this country, will be the claim on the brains and manhood of the nation to keep the vital services running under difficult conditions. Therefore, I feel that we must bring the nation again into touch with the air so as to make it realise this point, and also that it may give to the air of its best both in brains and physique. People must realise that flying training still requires a high degree of skill and concentration.

Accidents

"One of the greatest difficulties which we have to face, in which I hope you will be able to help, is that of the regrettable accidents which take place from time to time in the Air Service. You say, and rightly, that great inventions will lessen them. Well, it is up to you and your inventive geniuses to go on in that direction; but when this has all been done there will still be accidents, and the more flying increases the more will accidents increase, and the more the public sees of aviation, the more will it see of that side of it. And yet, there will be a considerable reduction in the number of accidents as compared with the amount of flying, and as time goes on the proportion will slowly widen. But there are two kinds of accident—those due to mechanical failures and those due to human error. The first could be, and probably will be, eliminated, but, although the human errors may be to a large extent counteracted by improvements in design, I believe that the actual standard of human error will remain constant for all time. In speaking of human error I do not mean human incompetence, however. The more flying pilots do the more competent they will become, and the less chance there will be of accident. I feel that we shall not make progress in the development of air unless all those who are responsible for such development have some knowledge of the difficulties of being in the air.

"There is one further point with which I wish to deal, and that is of very considerable importance. We cannot make the R.A.F. the great weapon it must be unless we have the backing of the whole country behind us. How are we to get this backing? You will have read in the newspapers the important debates on air estimates, and realised from them that the Government and members of Parliament fully realise the value of this new weapon in war.

"But it is up to me and my colleagues at the Air Ministry to do all in our power to assist in educating the general public in this respect so as to induce the best material to come forward into the Air Force. I am convinced that one of the most important means by which this may be achieved is through the great seats of learning, the universities, who are turning out into the world the young men of the country who will have such a great influence on its future. For this reason we are anxious to start at Oxford and Cambridge Air Force Units, as a beginning, and hope to do the same at other universities at a later date.

"At Cambridge, thanks to the assistance of Sir Geoffrey Butler, and the advice and encouragement we have received from your Vice-Chancellor, the President of the Board of Military Studies, General Costello, and many of your senior members who have been consulted in the matter, we have drawn up a rough outline of a scheme for the formation of an Air Force squadron at Cambridge.

"This Air Force squadron which, during term time, must be mainly kept alive by means of courses of instruction in engines, rigging, wireless, etc., and by lectures, with possible flying as observers at Duxford or some other Air Force station during



Paris-Dakar Attempt a Record

THE F.I.A. have, it is reported, now officially placed on record, as the greatest distance flown by an aeroplane in a straight line across country, the flight made on February 3-4 last by Capts. Arrachart and Lemaitre, when they flew from Etampes to Villa-Cisneros, a distance of 3,166 kms. (1,963 miles) in an attempt to reach Dakar, non-stop. The record for the greatest total distance, but not in a straight line, is still retained by Kelly and McReady, U.S.A., and Smith and Richter (re-fuelling).

Two Big Atlantic Flights Projected

Two trans-Atlantic flights have been planned for this summer. One, a French attempt, in which M. Tarascon and M. Coli propose making a non-stop flight from Paris to New York, while the other will be an Italian effort organised by Sig. D'Annunzio, in which two Savoia S.55 twin-engined flying-boats (recently described in FLIGHT) will make a flight

the term, if the university authorities will allow this, and with further flying during the long vacation, will, I trust, be the means of stimulating interest in the air as a whole at the university, and that the interest will be continued after members have gone down from the university and gradually throughout the country.

"It is impossible for me to say definitely when this unit will be formed, but I hope for October this year. Anyhow, when it is formed, I feel sure that I may count on the backing of the members of the university and the undergraduates to make the movement a success, and that they will do all in their power to impress on the nation as a whole the value of this arm.

"There is, I think, in this country an exaggerated idea as to the danger of flying. I am not going to say there is no danger, but I do say that in ordinary, straightforward flying the danger is small, and that when one takes into consideration the number of hours flown, the aerobatics performed, and other factors, I think the accidents may be said to be exceedingly few."

Professor C. E. Inglis, proposing a vote of thanks to the Air Chief, said that a certain sister University had sometimes been referred to as the home of lost causes, but the speaker did not think Sir Hugh Trenchard had come to Cambridge with any such housing proposition. Rather he seemed to consider Cambridge as a sort of national incubator for hatching out new and progressive ideas. On the subject of the proposed Cambridge University Air Squadron, Professor Inglis thought that, granted goodwill on the part of the University officials (and he thought there was every evidence that this goodwill would be forthcoming) there was no doubt about the success of the scheme. Professor Inglis caused much merriment by saying "I think there is no town in this country where there is a greater superabundance of excellent raw material. We rather senior aborigines of this ancient borough realise that—perhaps to our cost, for are we not rapidly and ruthlessly being divided in two classifications, which someone has somewhat prettily described as "the quick and the dead?"—the quick being those who are able to hop out of the way of motor-cycles, and the dead being those who do not possess sufficient agility to do so."

Professor B. Melvill Jones seconded the vote of thanks, which was carried with acclamation.

In replying Sir Hugh Trenchard assured his hearers that although red tape was supposed to be the predominant feature of most Government departments, he would do his best to ensure that it would not in any way choke the development of the Cambridge aviation scheme.

The Chief of the Air Staff was entertained to dinner by the R.A.F. Engineering Course and ex-R.A.F. officers who are at the University, Flight-Lieut. E. L. Howard-Williams, B.A., M.C., R.A.F. (who is President of the Cambridge University Aeronautical Society), presiding. Some 40 guests assembled to honour Sir Hugh Trenchard, among whom were: General Costello, V.C., who commands the O.T.C. at Cambridge, Professor C. Inglis, Professor B. Melvill Jones, Col. Stratton, Col. the Hon. Ian Campbell, Col. Knox Shaw, and Wing-Commander C. Bradley (of Duxford).

During the morning Cambridge was bombed with pamphlets in four air raids, in which Duxford excelled themselves, putting up a fine performance in aerobatics at the same time. Altogether the meeting can truthfully be described as a great success, and the progressive spirit in which those concerned accepted the new ideas seems to augur well for the future. It is conceivable, and even probable, that the time will come when the occasion of Sir Hugh Trenchard's address will be looked back upon as having marked a milestone in the history not only of Cambridge but of the R.A.F.



from Italy to the Argentine via Gardone, Rome, Gibraltar, Fernando Po, Pernambuco, Rio de Janeiro and Buenos Aires.

The "Los Angeles" Visits Porto Rico

ON May 4 the U.S. Airship "Los Angeles" (Z.R.3), with four passengers, 37 officers and men, and 200 lbs. of mail on board, left Lakehurst, N.J., for Mayaguez Harbour, Porto Rico, where she arrived after a cruise of 33 hours. There she was moored to the mast of the air tender "Patoka."

Fine Flight by South African Aeroplanes

LAST week South African aeroplanes accomplished a fine flight by flying from Windhoek (in late German S.W. Africa) to Pretoria, a distance of over 1,125 miles, in ten flying hours. They followed a compass course from Windhoek to Keetmanshoop (275 miles), from there to Upington (250 miles), thence to Kimberley (200 miles), and Pretoria (300 miles). The whole journey was over practically unknown and unrecognisable country.

RACING COMMITTEE

A MEETING of the Racing Committee was held on Wednesday, April 29, 1925, when there were present: Air Vice-Marshal Sir Sefton Brancker, K.C.B., in the Chair, Mr. A. S. Butler, Lieut.-Col. M. O. Darby, O.B.E., Group-Capt. C. F. Kilner, D.S.O., Lieut.-Col. F. K. McClean, A.F.C., and the Secretary.

Election of Chairman and Vice-Chairman.—Air Vice-Marshal Sir Sefton Brancker was elected Chairman, and Lieut.-Col. M. O. Darby Vice-Chairman, of the Racing Committee for the year 1925.

Light Aeroplane Competition, 1926.—The reports of the Joint Meetings of the Royal Aero Club, Air Ministry and Society of British Aircraft Constructors were received.

The King's Cup Race.—Capt. R. J. Goodman Crouch was appointed handicapper.

Mr. A. S. Butler having reported on the course between Harrogate and Glasgow, it was decided to make certain alterations in the route. From Harrogate the competitors will proceed to Newcastle and then to Glasgow. From Glasgow the competitors will proceed to Manchester and then to Bristol.

It was decided to offer a third prize of £50 if there were seven or more starters.

Grosvenor Challenge Cup.—It was decided that the race for this year should be on handicap over a course of 100 miles confined to all British aeroplanes, the weight of the engines of which must not exceed 275 lbs.

August Race Meeting at Lympne.—The programme of races was considered and approved.

Schneider Cup, 1925.—Lieut.-Col. M. O. Darby and Lieut.-Commander H. E. Perrin were appointed to represent the Club on the special committee to take in hand the arrangements for the British competitors for this year's race.

LIGHT AEROPLANE COMPETITION, 1926

A MEETING of the Joint Committee was held on Monday, April 27, 1925, when there were present:—

Royal Aero Club.—Air Vice-Marshal Sir Sefton Brancker, in the Chair, Lieut.-Col. M. O. Darby.

Air Ministry.—Major J. S. Buchanan, O.B.E.

Society of British Aircraft Constructors.—Mr. T. O. M. Sopwith, Capt. H. E. P. D. Acland, Mr. H. T. Vane, Sir Henry White-Smith, C.B.E.

In attendance: Mr. C. V. Allen, Secretary, S.B.A.C., and Mr. H. E. Perrin, Secretary, R.Ae.C.

The Regulations were further considered. It was decided to increase the course to 2,000 miles.

The weight of the Engine, which is limited to 170 lbs., includes carburettor and induction system, complete ignition equipment, air-screw hub and fastenings, exhaust pipes (if any) and radiator, pipes and water (if any).

THE KING'S CUP RACE

Prizes.—The King's Cup presented by His Majesty The King to the entrant of the aircraft which first completes two circuits of Great Britain in a Handicap Race.

£100 presented by Sir Charles C. Wakefield, Bart., to the winner of the King's Cup.

£100 presented by Mr. Samuel Samuel, M.P., to the entrant of the aircraft placed second.

£50 presented by the Royal Aero Club to the entrant of the aircraft placed third.

£100 presented by the Residents of Harrogate, to the entrant of the aircraft which completes the whole course in the fastest time.

£50 presented by the Residents of Harrogate to the entrant of the aircraft which makes the fastest handicap time to Harrogate on the first day.

£50 presented by the Residents of Harrogate to the entrant of the aircraft which makes the fastest handicap time from the commencement of the race to the Harrogate control on the second day.

Course.—The course has been altered as follows:—

First Circuit				Miles
London to Harrogate	..	..	..	173
Harrogate to Newcastle	..	..	..	70
Newcastle to Renfrew	..	..	..	124
Renfrew to Manchester	..	..	..	190
Manchester to Bristol	..	..	..	126
Bristol to London	..	..	..	100
				783

Second Circuit				Miles
London to Bristol	..	..	..	100
Bristol to Manchester	..	..	..	126
Manchester to Renfrew	..	..	..	190
Renfrew to Newcastle	..	..	..	124
Newcastle to Harrogate	..	..	..	70
Harrogate to London	..	..	..	173
				783

Entries.—The entry fee is £10. This fee, together with entry form, must be received by the Royal Aero Club, 3, Clifford Street, London, W.1, not later than 5 p.m. on Friday, June 12, 1925.

Offices: THE ROYAL AERO CLUB.

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary

Married

Flight-Lieut. ROBERT S. T. FLEMING, R.A.F., late Capt. 93rd Burma Infantry, I.A., eldest son of Dr. and Mrs. Robert A. Fleming, of 10, Chester Street, Edinburgh, was married on April 27, at the Cathedral Church, of St. Mary, Edinburgh, to CECILIA ("NANCY"), younger daughter of the Rev. ERNEST and Mrs. POWLES, of Snailwell Rectory, Newmarket.

The wedding of Squadron-Leader ARTHUR WILLOUGHBY FALLS GLENNY, M.C., D.F.C., Royal Air Force, and Miss AVICE NOEL BOYES took place on April 29 at St. George's Church, Hanover Square.

BASIL EVERARD CATCHPOLE, M.C., D.F.C., Croix de Guerre, third son of Mr. and Mrs. Arthur E. Catchpole, of Hatzic, British Columbia, was married, on April 29, at St. Andrew's Presbyterian Church, Hampstead, to ELSIE, younger daughter of Mr. and Mrs. FRED. B. GLOVER, of 11, Arkwright Road, Hampstead.

Flight-Lieut. FREDERICK HAROLD ISAAC, D.F.C., eldest

son of Walter Isaac, J.P., and Mrs. Isaac, was married on April 25, at St. Mary's Parish Church, Twickenham, to MURIEL, daughter of ARTHUR KING-FARLOW and the late Mrs. King-Farlow (formerly of Teddington).

On April 21, at Outwood Parish Church, Surrey, Flying Officer ERIC WORMELL, R.A.F., youngest son of Mr. and Mrs. W. J. Wormell, was married to MARCIA, second daughter of Mrs. HANBURY.

To be Married

The marriage arranged between Mr. F. D. H. DAVIES, R.A.F., and Miss ALDYTH TUDOR will take place at St. Paul's Church, Camberley, on Thursday, June 4, at 2.15 p.m.

Death.

Lieut.-Col. HAMILTON, late R.A.M.C. and R.A.F., M.D., M.R.C.S., L.R.C.P., who died suddenly on April 26, of heart failure, at "Accra," St. Mark's Hill, Surbiton, was the son of the late General William Conrad Hamilton, late Punjabi Rifles.

ROYAL AERO CLUB AUGUST AIR RACE MEETING

THIS meeting (under the Competition Rules of the Royal Aero Club and the Regulations of the F.A.I.), to be held at Lympne, near Hythe, takes place on Saturday, Sunday and Monday, August 1, 2 and 3, 1925.

The following is the provisional programme :—

International Handicap.—Open to all aeroplanes. The race is over a distance of approximately 100 miles, comprising eight circuits of the course.

First prize, £150. If five starters, the second will receive £50. Entry fee, £2.

Grosvenor Challenge Cup Handicap.—The aeroplane and engine must have been entirely constructed in the British Empire. The weight of the engine must not exceed 275 lbs. The entrant and pilot must be British subjects. The entrant must be an individual and not a company. The race is over a distance of approximately 100 miles, comprising eight circuits of the course.

First prize, £100; second prize, £50. Entry fee, £2.

Light Aeroplane Holiday Handicap (International).—Open to light aeroplanes (single and two-seaters). The weight of the engine must not exceed 170 lbs. The race is over a distance of approximately 50 miles, comprising four circuits of the course.

First prize, £100. If five starters, the second will receive £25. Entry fee, £2.

Single-Seater Light Aeroplane Scratch Speed Race (International).—Open to light aeroplanes (single-seaters). The weight of the engine must not exceed 120 lbs. The race is over a distance of approximately 50 miles, comprising four circuits of the course.

First prize, £50. If five starters, the second will receive £20. Entry fee, £2.

Two-Seater Light Aeroplane Scratch Speed Race (International).—Open to light aeroplanes (two-seaters). The weight of the engine must not exceed 170 lbs. The race is over a distance of approximately 50 miles, comprising four circuits of the course.

First prize, £50. If five starters, the second will receive £20. Entry fee, £2.

Private Owners' Handicap (International).—Open to

all aeroplanes, privately owned and registered in the name of an individual. (The definition of "Privately owned" is to be at the sole discretion of the Royal Aero Club.) The race is over a distance of approximately 50 miles, comprising four circuits of the course.

First prize, £100. If five starters, the second will receive £25. Entry fee, £2.

Inter-Club Race.—Open to D.H. "Moths" owned and entered by the Light Aeroplane Clubs. It will be a scratch race over a distance of approximately 50 miles, comprising four circuits of the course.

First prize, £100. If five starters, the second will receive £25. Entry fee, £2 per aeroplane.

Certified Performances for Light Aeroplanes.—Single seaters and two-seaters.

The weight of the engine must not exceed 170 lbs.

The Royal Aero Club will give certificates of performance in the following classes :—

Class I.—Height in a given time—30 minutes.

Class II.—Greatest speed over 3 kms.

Class III.—Greatest speed over 50 kms.

Class IV.—Height.

A prize of £25 will be given for the best performance in each class.

Prizes will only be given in classes where there are at least three competitors. Entry fee, £1 for each class.

All races will be held over the course of 12½ miles, starting and finishing on the aerodrome.

In all cases where aeroplanes are entered as two-seaters a passenger must be carried, and the weight of the pilot and passenger must be at least 340 lbs. Any shortage of weight must be made up with ballast.

Competitors must comply with the Air Navigation Regulations in force, subject to any concessions which may be made by the Air Ministry for these races.

Where the weight of engine is specified, this will include carburettor and induction system, complete ignition equipment, air-screw hub and fastenings, exhaust pipes (if any) and radiator, pipes and water (if any).

◆ ◆ ◆ ON TRAVELLING BY AIR Mr. S. F. Edge Expresses Some Interesting Views

To those of us who are intimately connected with aviation it is often a matter of very considerable difficulty to "see ourselves as others see us." Those who are directly concerned in the construction and/or operation of aircraft naturally look upon matters from an entirely different point of view, often, it is to be feared, with a certain amount of prejudice, and always tinged by the sentiment that must ever attach to the growing up of a new art, science or industry. For this reason it is always interesting to hear the views of someone not connected in any way with aviation, more especially when that someone is a business man prominent in other branches of engineering and transport. It is, therefore, with considerable satisfaction that we are able to publish this week a few notes dealing with the impressions formed by Mr. S. F. Edge when, during the latter part of April, he made the journey from London to Paris and back by air, and which he has been good enough to give us recently when we had a chat with him on the subject.

To begin with, Mr. Edge seems to have been somewhat unfortunate in choosing April for his journey, for he said that on the outward trip he was the only passenger in the machine, and on the homeward journey there were but three passengers in addition to himself. Mr. Edge thinks that this scarcity of passengers must be due to lack of the right kind of publicity for attracting passengers, and suggests that a great improvement might be effected by constant and widespread circulation of interesting items connected with the subject of the air lines. Mr. Edge believes that many people consider air travel dangerous. He suggests as a remedy the publication of statistics showing the number of miles flown without accident. He would also constantly supply the newspapers with the names of prominent people travelling by air in order to secure the confidence of others.

Concerning the actual flights, the machines, the engines, the passenger accommodation, etc., Mr. Edge made some very keen observations, and his views, untinged by prejudice as they are, are particularly interesting. The first thing he noticed was that there was in the saloon no printed matter of any sort pointing out the peculiarities or advantages of air travel. On taking his seat in the cabin he noticed that the

chair was secured in place by a strap, the legs fitting into thimbles in the floor. The strap, however, was not tight enough, and on leaning back the legs came out of the thimbles. Mr. Edge pointed out that if the chair had been left in this state the feeling, on the machine taking off at a steep angle, might have been alarming to a nervous passenger. Mr. Edge also commented on the oiliness of camshaft casings and on the wires, which gave the engines a slovenly appearance that they did not deserve, and he suggested that passengers should be provided with some little pamphlet setting forth the reasons for these various things. These pamphlets should also explain that in rising off the ground the aeroplane does so at a fairly steep angle, and that when a turn is made the machine banks over. Nervous passengers would then realise that these are normal manœuvres and would not become alarmed. A brief explanation of "bumps," comparing them with sea waves, would, Mr. Edge thought, serve to reassure the passengers who might otherwise receive the impression that the machine was not under proper control. He made the very sound suggestion that all the machines should be named as, rightly or wrongly, passengers do take a fancy to particular machines or types. Mr. Edge thought that there should be two pilots on board, especially if the spare pilot could be allowed occasionally to go into the cabin and explain various subjects to the passengers. He recommended the issue to passengers of ear protectors as a means of increasing the comfort.

In connection with the arrangements at the terminals Mr. Edge was not impressed. In fact, he complained of the lack of smartness, which might, he said, be due to insufficient business to keep them really busy. Another small point raised by Mr. Edge, but one showing how he must have paid attention to detail, was that on the ticket no address or telephone number of Imperial Airways in Paris was given.

While not agreeing with Mr. Edge in all his views on how to improve air travel, we do think they are worthy of very serious consideration by those responsible for operating our air lines, and if other prominent people who have travelled by air could be persuaded to give their views, much might be done to improve matters.

SOME ASPECTS OF THE COMPARISON OF MODEL AND FULL-SCALE TESTS

THE Wilbur Wright Memorial Lecture given by D. W. Taylor, E.D., D.Sc., LL.D., before the Royal Aeronautical Society on April 30, dealt with the fundamental mathematical treatment of the principle of dimensional homogeneity, first fully enunciated by Riabouchinski, and Dr. Taylor followed mainly the methods developed by his compatriot, Dr. Buckingham. Dr. Taylor, it should be pointed out, is a member and secretary of the United States National Advisory Committee for Aeronautics, and it will be recollected that a few years ago another great American expert in the subject of aerodynamics, Dr. Ames, also read a paper before the Royal Aeronautical Society.

Dr. Taylor's paper was one of very considerable length, and it is quite out of the question for us to publish it in full. From the very nature of the subject it will be realised that the paper does not lend itself to summary treatment, and we can, therefore, refer to only one aspect of it, *i.e.* that dealing with certain results obtained by the Americans in their new variable-density wind tunnel. This subject has appeared of particular interest to us in view of the fact that a similar tunnel has not yet been operated in this country, although it would seem a most valuable means of getting to the bottom of the phenomenon known as "scale effect" and other important subjects.

After a detailed statement of the derivation of formulæ expressing in terms of m , l and t (mass, length, and time) the various quantities to be considered, Dr. Taylor said :

"Having then reduced our original broad formula to

$$R = \rho L^2 V^2 F_s (LV/\nu)$$

involving the density, the size, the speed, and some unknown function of LV/ν , the well-known Reynolds' number, we need to form some conception of the effect of Reynolds' number, commonly called the scale effect. While we do not know the form of the function, we do know for the flow of water, oil, and air in pipes the relative experimental values. The original wonderful experiments by Reynolds have been repeated and amplified by others since 1880, and it seems established that at low speeds where the fluid flows smoothly F_s has one set of values, and at high speeds when the motion is completely turbulent there is another well-defined set of values, while for intermediate speeds values are rather indeterminate. Wind tunnel investigations on such objects as cylindrical wires, struts and streamline wires show that the

resistance departs appreciably from the Law of the Square with variation of Reynolds' number.

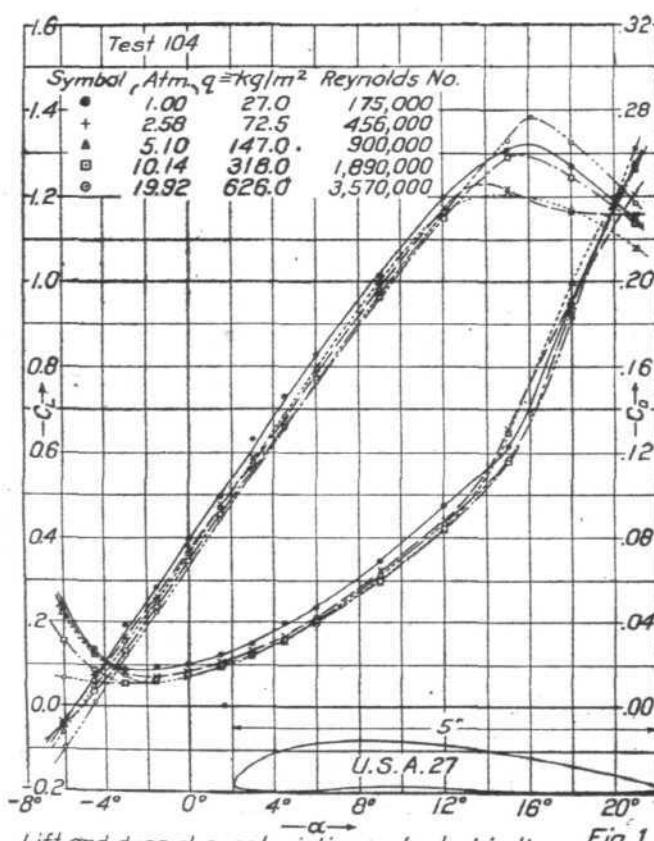
"When we come to such objects as an airplane, however, we have difficulty with the ordinary wind tunnel. For constant Reynolds' number to test a model, say one-twentieth scale, would require wind tunnel speed twenty times the actual flying speed, and there are no wind tunnels that can come in sight of this performance. Such speeds would be greater than the velocity of sound. There appears to be only one practicable solution of the difficulty, namely, the use of a testing tunnel where we vary the density of the air and hence the value of ν .

"The kinematic viscosity coefficient ν for air varies inversely as the pressure and decreases with temperature according to a somewhat complicated relation. Table I below gives numerical values when the unit of length is the centimetre and the unit of time the second.

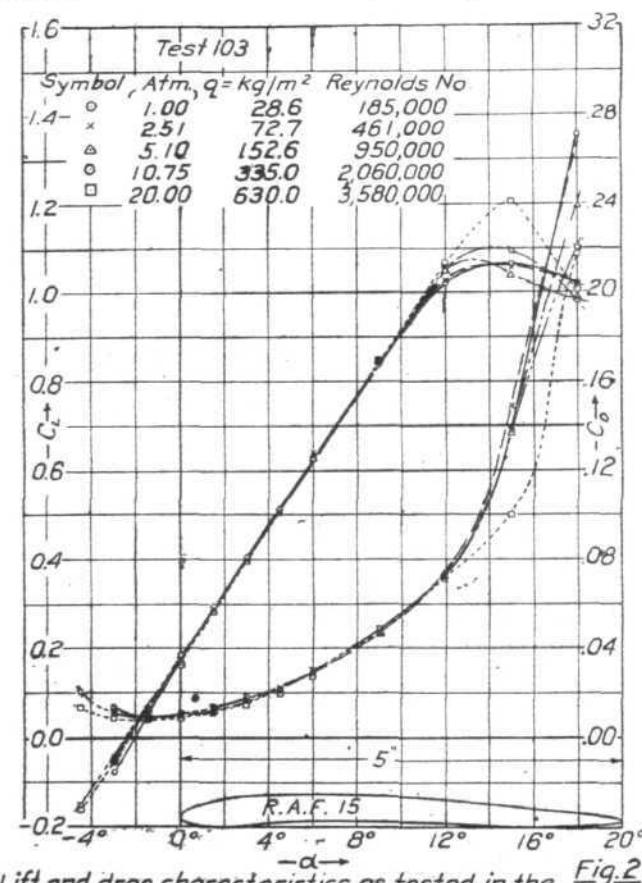
TABLE I.
Kinematic Viscosity Coefficients ν in $\text{cm}^2/\text{sec.}$

Temp. Cent.	Pressure in atmospheres.				
	1/10	1	5	10	20
50	1.284	0.1284	0.02568	0.01284	0.00642
40	1.292	0.1292	0.02584	0.01292	0.00646
30	1.300	0.1300	0.02600	0.01300	0.00650
20	1.308	0.1308	0.02616	0.01308	0.00654
10	1.318	0.1318	0.02636	0.01318	0.00659
0	1.329	0.1329	0.02658	0.01329	0.00665
-10	1.340	0.1340	0.02680	0.01340	0.00670
-20	1.351	0.1351	0.02702	0.01351	0.00676
-30	1.364	0.1364	0.02728	0.01364	0.00682
-40	1.378	0.1378	0.02756	0.01378	0.00689
-50	1.392	0.1392	0.02784	0.01392	0.00696

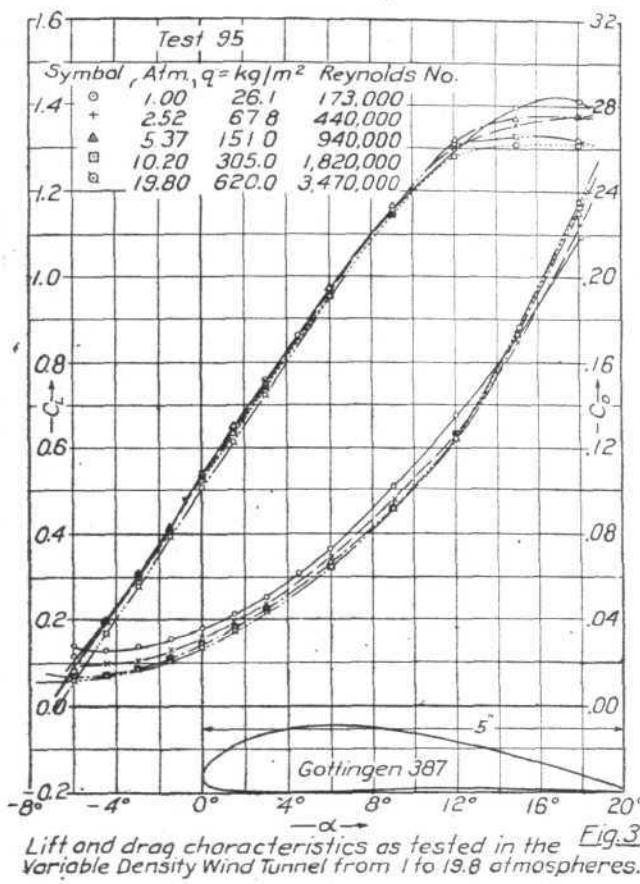
"The variable density wind tunnel of the National Advisory Committee for Aeronautics, as originally suggested by Dr. Munk of our staff, was described to the Society two years ago and a few sample results given. A good deal of experience has been had since then with the appliance. One lesson of experience has been that when we are working under a pressure of 20 atmospheres it takes but a small electrical spark to kindle a substantial fire. However, these little practical difficulties have been overcome, and experience in testing a



Lift and drag characteristics as tested in the Variable Density Wind Tunnel from 1 to 19.92 atmospheres.



Lift and drag characteristics as tested in the Variable Density Wind Tunnel from 1 to 20.0 atmospheres.



Lift and drag characteristics as tested in the Fig. 3 Variable Density Wind Tunnel from 1 to 19.8 atmospheres.

number of different airfoils, etc., indicates that this apparatus, or the equivalent, is essential if we are to make a thoroughly reliable second approximation to the performance of an airplane from model tests.

Reynolds' number— LV/ν —is a compound ratio whose numerical value in the case of any given object depends upon the ratios between the actual values of LV and ν and their unit values. Unfortunately, each type of object has its own series of Reynolds' numbers, because as a rule the values of L are not comparable for dissimilar objects. Thus, for an airplane wing we naturally use for L in Reynolds' number the length of the chord. For an airship we would use the length or the diameter or any linear function of the

Wright Bros.' Historic Biplane for England

ORVILLE WRIGHT has announced that it is his intention to present the original Wright biplane, designed and constructed by himself and his brother, to the Science Museum, South Kensington. This machine, which made its first flights at Kitty Hawk, South Carolina, on December 17, 1903, will, indeed, form a most valuable and acceptable addition to the already extremely interesting collection of aircraft exhibits at South Kensington.

Royal Air Force Iraq Dinner

IT is proposed to hold this dinner at the Holborn Restaurant, at 8.15, for 8.45, on the evening of June 27, 1925 (the day of the R.A.F. Display). All tickets must be applied for before June 1, 1925, and a remittance must accompany the application, together with a statement of the unit with which the officer served. The dinner will be purely for Royal Air Force Officers who have served in Iraq since the Armistice, and admittance will be by ticket only. Air Marshal Sir John Salmond, K.C.B., C.M.G., G.V.O., D.S.O., has kindly consented to take the chair, and Air Commodore A. E. Borton, C.B., C.M.G., D.S.O., to act as Vice-Chairman. Tickets, 12s. 6d., exclusive of all wines, on application to R.A.F., Iraq Dinner Committee, A. and A.E.E., Martlesham Heath.

Gordon Bennett Balloon Race

THE Royal Aero Club will be represented by three competitors in the Gordon Bennett Balloon Race at Brussels on Sunday, June 7 next, as follows:—Mrs. John Dunville's "Banshee III" (80,000 cub. ft.); pilot, Lieut.-Col. John D. Dunville or Squadron-Leader F. W. Baldwin. E. Allen's "Elsie" (80,000 cub. ft.); pilot, Capt. J. F. Johnson or Commander F. L. M. Boothby, R.N., and E. Allen. Mrs.

two. But L for the airship would not be comparable with L for the airplane.

Considering airplanes as they are using the chord of the wing in inches as L , and speeds in statute miles per hour, the Reynolds' numbers come out fairly large. Thus, for an airplane of 5-ft. chord, at 100 miles per hour in a normal atmosphere the Reynolds' number will be some 4,800,000. For its model of 6-in. chord in a wind tunnel at 100 miles per hour with normal air the Reynolds' number will be 480,000.

Attention is invited now to Figs. 1 to 3, giving in condensed form results of recent tests of three airfoils of well-known form in the variable density wind tunnel. Necessary data as to the conditions and the airfoil section to which they apply are shown on each figure. Results are plotted as curves of lift and drag coefficients as ordinates over angles of attack— α as abscissæ, following the standard practice of the U.S. Advisory Committee. Fig. 1 shows results for an American section, U.S.A. 27; Fig. 2 shows results for a British section, R.A.F. 15; Fig. 3 shows results for a German section, Göttingen 387. It happens that these three typify the medium, the thin and the thick sections.

Ignoring minor eccentricities due to accidental causes, unavoidable experimental error, etc., these curves seem to warrant a few broad conclusions which, by the way, are in agreement with other results too numerous to include.

In the first place, the scale effect appears to have more influence upon the drag than upon the lift. This may be explained upon theoretical grounds.

In the second place, the scale effect increases more and more slowly as the Reynolds' number increases, so that conclusions drawn from experiments with airfoils within the Reynolds' number range of ordinary wind tunnels cannot safely be extended to much larger Reynolds' numbers.

In the third place, the consistency of the results gives us reason to think that for present-day airplanes we are justified in ignoring the effect of other factors than Reynolds' number in reaching our second approximation to aerodynamic properties of airfoils.

In the fourth place, the thin airfoil appears to show less scale effect than the thick airfoil.

In the fifth place, so far as airfoil action is concerned, the scale effect is, after all, secondary, though by no means negligible when we undertake to estimate closely.

The comments above apply only to airfoils. They do not necessarily apply to wires, struts, etc. Such appendages can be tested separately in the ordinary wind tunnel at Reynolds' numbers much closer to the numbers on the full-sized airplane than is possible with the airplane structure proper."

The last sections of Dr. Taylor's paper dealt with the subject of airscrews.

Arthur Spencer's "Miramar" (80,000 cub. ft.); pilot, Capt. C. W. Spencer or Capt. C. W. Berry.

British Empire League

AIR VICE-MARSHAL SIR W. S. BRANCKER and Mr. Alan Cobham will be entertained to luncheon by the British Empire League, on Thursday, May 21, at the British Empire Club, in connection with their recent flight to Rangoon and back. Major-General J. E. B. Seely will preside.

The Royal Air Force Memorial Fund

A MEETING of the Grants Sub-Committee was held at the offices of the Royal Air Force Memorial Fund, 7, Iddesleigh House, Caxton Street, London, S.W.1, on Thursday, April 30, the following members of the committee being present: Lieut.-Commander H. E. Perrin (Chairman); Mrs. L. M. K. Pratt-Barlow, O.B.E.; Mr. W. S. Field; Squadron-Leader E. B. Beauman. The Committee considered 18 cases of appeals for assistance, and made grants amounting to £103 1s. 6d.

The "R.E.P. Joy-Stick" Claim

In connection with the famous "R.E.P. Joy-Stick" case—which we have previously referred—it is an interesting fact that the first patent in the world for a single-stick aircraft control was granted to a British subject in 1906, namely, A. V. Roe. The difference between Enault-Pelterie's patent and Mr. Roe's was very slight. M. Enault-Pelterie was claiming something in the neighbourhood of £1,000,000 from the British Aircraft Constructors for using his invention, but the Paris Court non-suited him. It was decided that Mr. Roe was merely acting as the agent of the British Government, which ordered aeroplanes provided with "joy-sticks," and as a foreign Government cannot be sued in the French courts, the suit must fail.

AIR SECRETARY'S EASTERN TOUR

Sir Samuel Hoare's Speech at the Academy Banquet

On the occasion of the Royal Academy Banquet at Burlington House on May 2, Sir Samuel Hoare, Secretary of State for Air, in responding on behalf of the Air Force, said he was grateful to the President for having once again included the Royal Air Force in the toast, and for once again having given him the chance of offering thanks on behalf of the Air Force. The officers and men of the Royal Air Force deserved the admiration of all, and he was glad to think that year by year the vital value of their work was being better realised.

He was in the fortunate position that evening of being able to testify at first hand to the fine achievement of the Force in distant lands. For it was only late the previous night that the Secretary of State for the Colonies and he returned from a journey in which, during the space of the Easter recess, they had travelled 3,500 miles by air and visited from end to end the territories that they were now administering from the Mediterranean to the Persian Gulf. Within the sphere of influence of the British Empire there were no countries better suited than these for testing the efficiency of the Air Force and for proving the great value of air power for Empire defence and the development of Empire communications.

As to Empire defence, they found Iraq a country 800 miles in length, controlled from the air by eight squadrons of the Royal Air Force and in spite of its turbulent record for a thousand years, enjoying a greater tranquillity than it had experienced since the days of Haroun-al-Raschid. The Secretary of State for the Colonies would, he knew, be the first to acknowledge the fact that but for the efficiency of the Royal Air Force the splendid work of the British Civil administrators would have been impossible.

As to the use of air for Imperial communications, he would point out as an example the journey they had just completed. He had noticed it described as an adventurous journey, and he had been offered kind congratulations upon his safe return. The journey, thanks to the efficiency of the Royal Air Force was no more adventurous than a journey by land or sea, and, whilst he appreciated the congratulations of his friends, he could assure them that he was no more entitled to them than he would be after a long tour by train, or ship, or motor. That the air was becoming a great Imperial highway was shown by the fact that in a few weeks they had made by air a journey which would otherwise have taken 12 months. They had traversed Iraq from end to end, and had visited the mountains of Kurdistan and the Persian plains, through which



R.33's Crew Visit the Air Ministry

As briefly announced in last week's issue of FLIGHT, Flight-Lieut. R. S. Booth and his gallant crew of 19 paid a visit on April 28 to the Air Ministry to receive official congratulations on having brought the R.33 safely back to Pulham after it had been blown across the North Sea. It was unfortunate that, owing to some misunderstanding, certain members of the crew were kept waiting outside Astra House for some time before they eventually were ushered into the conference room. However, Lieut. Booth and his crew were received by Air Chief-Marshal Sir Hugh Trenchard, Chief of the Air Staff, who was accompanied by Air Vice-Marshal Sir Geoffrey Salmond, Air Member for Supply and Research on the Air Council, and Group Captain Peregrine Fellowes, Director of Airship Development. Sir Hugh expressed his high appreciation and tendered his congratulations to the crew, shaking hands with each individual member.

"Sky Printing"

A NEW method of sky writing, which the inventor describes as "sky printing," has been patented in the principal countries of the world by Mr. R. D. Bailey, F.C.S., F.R.M.S., of 20, Church Road, Seaforth, Liverpool. The method is as follows:—From an aeroplane flying at five or six thousand feet, groups of fireworks—bursting into coloured stars at night or smoke-puffs during the day—are fired so as to produce letters, numerals, trade-marks, etc. The apparatus employed for doing this consists of small firing machines, each constituting a letter by having a series of Very's pistol barrels pointing in different directions, according to the letter required. Very's lights or smoke-puff generating cartridges are placed in these pistol barrels, and the pilot fires one of the machines by pulling a lever, thereby projecting a group of "fireworks" into the air, some 300 ft. or more from the aeroplane, where they burst simultaneously in the formation of a letter about 80 yards square. It is claimed that this method of "sky

the British pipe-line brings oil for the use of the Fleet; they had stayed in Trans-Jordan, Palestine and Egypt, and had the opportunity of inspecting almost every British activity, military and civil, in these distant and often inaccessible countries. A long and varied, but not an adventurous journey, for British pilots, British machines and British organisation enabled them to perform it without risk and even without delay or incident.

In that assembly were gathered many men of long views and vivid imagination. Let them picture to themselves the striking contrasts of this journey, the ruins of past ages, empires and religions of Ur of the Chaldees, of Nineveh and of Babylon on the one hand, and, on the other, the throbbing motors of their machines, the keenness, the courage and the drive of the British pilots of the era of today.

Let them picture to themselves the scenes unique in our political history, in which, thanks to air transport, two British Secretaries of State had, during the Easter recess, interviewed Arab sheiks, who had seen an aeroplane before they had seen a house, Kurdish chieftans, Assyrian hillmen and even the chief of that curious sect the Devil worshippers, whose doctrine, somewhat cynical in theory but harmless in practice, was to worship the power for evil on the ground that the power for good would prove propitious whether he were worshipped or not.

That two British Ministers had been able to make this journey, that they had been able to study upon the spot difficult problems of Imperial administration, that they had been able to find—as he hoped they had—opportunities for the reduction of Imperial expenditure, was due to the efficiency of the Royal Air Force.

It was the spirit of keenness and enterprise that had enabled it to achieve so much in the Middle East. It was this spirit of keenness and enterprise that at home was building up the air defence that we needed for the British Isles and the British Empire. It was this spirit of enterprise and keenness that, ready to face risk and danger, brought back the R. 33 to her mooring mast at Pulham. It was this spirit of keenness and enterprise that would drive through the air a new highway for the British Empire and make their journey of no account when Ministers and traders and travellers would pass swiftly and easily as a matter of ordinary routine from one end of it to another and unite it by an aerial line of closer and quicker intercourse.



printing" has the advantages of cheapness, speed, and that it requires no special skill on the part of the pilot nor a special "stunting" machine.

Faireys for Holland

THE Fairey Series III seaplanes, Napier "Lion" engine, recently ordered by the Dutch Government, were delivered last week. The whole of the machines passed their acceptance tests without a hitch, the conditions of the Dutch naval authorities being met without difficulty. In addition to the speed tests, a climb with full load was made to a height of over 17,000 ft. This was not the absolute ceiling of the machines, but was the required service ceiling of the Dutch authorities. The machines were then handed over to a commission of Dutch officers, who have been practising on them in preparation for a flight to Holland. Vice-Admiral J. H. Zeeman attended at the Hamble works of the Fairey Company for final acceptance of the machines. The Dutch pilots have expressed themselves delighted with the properties of the machine and engine.

R.A.F. Flying Accidents

THE Air Ministry regrets to announce the following accidents. As a result of an accident at Melleha, Malta, to a Fairey 3 D. landplane of No. 440 Flight, Malta, on April 30, Flying Officer Christopher Denison, the pilot of the aircraft, was killed, and Lieut. Henry Thew Rust, R.N., and Telegraphist Oliver, were injured.

In a collision in the air near Leuchars between two Fairey 3 D. machines of Royal Air Force Base, Leuchars, at 10 a.m. on May 1, 1925, Harry Lestourgeon Roseveare, Lieutenant, R.N., Flying Officer, R.A.F., the pilot of the aircraft, and his passenger, No. 335838 Corporal Tom Vincent Warwick, R.A.F., were killed. Edward Acton Alcock Gibbon, Lieutenant, R.N., Flying Officer, R.A.F., the pilot of the other machine, and his passenger, No. 35763 A.C.1 Austin Joseph Stewart, R.A.F., escaped uninjured.

THE ROYAL AIR FORCE

London Gazette, April 28, 1925
General Duties Branch.

L. S. Potter is granted a short-service commn., as a Flying Officer, with effect from, and with seniority of, April 7, 1925. Pilot Officer on probation E. C. Boucher is confirmed in rank (April 16). Wing Commander E. L. Gossage, D.S.O., M.C., is seconded for three years' duty at the Staff College, Camberley (Jan. 22).

Stores Branch.

Flying Officer M. R. Preece is placed on retired list (April 18).

Medical Branch.

Flight-Lieut. C. P. Barber is granted a permanent commn. in rank stated

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: D. L. Allen, A.F.C., and T. L. Leigh-Mallory, D.S.O., to R.A.F. Staff College, Andover, for Staff Course; 4.5.25. W. L. Welsh, D.S.C., A.F.C., to H.Q. Mediterranean, Supernumerary; 8.4.25.

Squadron Leaders: C. H. B. Blount, O.B.E., M.C., C. H. Nicholas, D.F.C., A.F.C., G. C. Bailey, D.S.O., and E. A. Beaulah, to R.A.F. Staff College, Andover, for Staff Course; 4.5.25. P. B. Hunter, to No. 4 Flying Training Sch., Egypt; 1.4.25. E. J. P. Burling, D.S.C., D.F.C., to No. 444 Flight, Lee-on-Solent; 27.4.25.

Flight Lieutenants: Hon. R. A. Cochrane, A.F.C., J. K. Waugh, D.S.C., W. F. Anderson, D.S.O., D.F.C., T. F. W. Thompson, D.F.C., A. H. Orlebar, A.F.C., W. H. Park, M.C., D.F.C., S. E. Toomer, D.F.C., R. P. M. Whitham, M.C., H. P. Lloyd, M.C., D.F.C., J. H. Butler, R. M. Foster, D.F.C., S. C. Strafford, D.F.C., and J. Blackford, to R.A.F. Staff College, Andover, for Staff Course; 4.5.25. G. E. Livock, D.F.C., to No. 24 Sqdn., Kenley; 1.5.25. W. R. B. Annesley, to No. 1 Sch. of Tech. Training (Boys), Halton; 4.5.25. R. H. M. S. Saundby, M.C., A.F.C., to Aden Flight, Egypt; 24.3.25. S. M. Kinkead, D.S.O., D.S.C., D.F.C., to H.Q., Egypt; 28.3.25. D. S. Earp, D.F.C., to H.Q., Iraq; 15.4.25.

Flying Officers: N. C. Bretherton, (Hon. Flight-Lieut.) H. W. A. Fox, (Hon. Flight-Lieut.) R. W. M. Hall, and (Hon. Flight-Lieut.) F. W. Wiseman-Clarke, to Aircraft Depot, India; 8.3.25. W. A. Opie, to Aircraft Depot, India, instead of to No. 31 Sqdn., as previously notified; 27.2.25. J. C. Walker, to No. 4 Flying Training Sch., Egypt; 13.2.25. J. W. Turton Jones, to Aircraft Depot, India; 17.4.25. R. H. Mahon, to Aden Flight, Egypt; 8.4.25. H. S. Hobby, M.C., to No. 28 Sqdn., India; 2.3.25. L. E. Cutforth, to Aircraft Depot, India, instead of to No. 5 Sqdn., as previously notified; 13.2.25. G. J. Gaynor, to No. 70 Sqdn., Iraq; 8.3.25. G. S. Brown and L. H. Brooke, to R.A.F. Base, Gosport; 27.4.25. R. L. Bateman, to No. 2 Flying Training Sch., Digby; 27.4.25. F. E. Nuttall, to No. 24 Sqdn., Kenley, instead of to No. 2 Flying Training Sch., as

(April 22). Flight-Lieut. D. J. Jones, M.B., relinquishes his temp. commn. on account of ill-health (April 1).

Reserve of Air Force Officers.

The following is confirmed in rank (April 28):—Flying Officer J. G. Good-year.

Flight-Lieut. J. F. Stallard is employed with the Regular Air Force for a period of one year (April 8).

Memorandum.

Flying Officer J. J. O'Connor relinquishes his temporary commission on ceasing to be employed (April 1).

previously notified; 27.4.25. H. A. J. de S. Barrow, to remain at R.A.F. Depot, instead of to No. 16 Sqdn., Old Sarum, as previously notified. E. S. Bullen, to C. and M. Party, Cattewater; 28.4.25.

Pilot Officers: J. A. P. A. Yearsley, to Aircraft Depot, India, instead of to No. 28 Sqdn., as previously notified; 27.2.25. W. J. Brett, to No. 27 Sqdn., India; 17.3.25. R. W. Holden, R. O. Jones, and W. Wynter-Morgan, M.C., to Aircraft Depot, India; 8.3.25. G. M. Pitts-Tucker, to No. 70 Sqdn., Iraq; 25.3.25.

Stores Branch

Flight Lieutenant: K. D. G. Collier, to Stores Depot, Egypt; 19.3.25.

Flying Officers: W. Best, to No. 1 Wing H.Q., India; 3.10.24. R. Lamb, to No. 20 Sqdn., India; 5.1.25. F. C. C. Hitchens, to No. 28 Sqdn., India, instead of to No. 20 Sqdn., as previously notified; 24.1.25.

Accountant Branch

Flying Officers: G. W. Lynn, to No. 41 Sqdn., Northolt; 5.5.25. J. Charles, to remain at No. 111 Sqdn., Duxford, instead of to No. 39 Sqdn., as previously notified. J. A. Coleman, to H.Q., Accountant Office, Iraq; 23.2.25. H. Hedderwick, to Brigade Accountant Office, Iraq; 23.2.25.

Pilot Officer: K. E. M. Holmes, to No. 39 Sqdn., Spittlegate; 20.4.25.

Medical Branch

Squadron Leader: J. T. T. Forbes, to H.Q., Egypt; 6.4.25.

Flight Lieutenants: D. McLaren, M.B., to No. 4 Flying Training Sch., Egypt; 31.3.25. J. A. Perdrau, M.D., to No. 100 Sqdn., Spittlegate; 22.4.25. E. D. D. Dickson, to R.A.F. Depot; 1.5.25.

Flying Officers: W. A. Beck, M.B., D.P.H., to Aeroplane and Armament Experimental Estabt., Martlesham Heath; 21.4.25. T. W. Wilson, to No. 2 Flying Training Sch., Digby; 28.4.25. B. Pollard, to Central Flying Sch., Upavon; 26.3.25. F. W. G. Smith, M.B., B.A., to Basrah Combinh Hospital, Iraq; 2.4.25. C. J. MacQuillan, M.B., B.A., to R.A.F., Britisd Hospital, Iraq; 4.4.25. F. P. Schofield, M.B., to H.Q., Iraq; 24.4.25. H. J. Henderson (Dental), to No. 4 Sqdn., S. Farnborough; 4.5.25.

IN PARLIAMENT

R.A.F. Boy Recruits

COLONEL DAY on April 29 asked the Secretary of State for Air the number of boys under 17 who had been recruited into the Royal Air Force during the past two months as a result of Press advertisements or otherwise; and whether any of these boys are being, or will be, trained for service on bombing aeroplanes?

Sir S. Hoare: As regards the first part of the question, boys are recruited for the Air Force only twice a year, and the last recruiting period was in January, when 350 boys were attested. As regards the second part of the question, none of these boys is under training as a pilot, and it is impossible to foresee whether any, and, if so, how many, will eventually be employed for aerial work in bombing squadrons.

Training School, Wales

CAPTAIN GARRO-JONES asked the Secretary of State for Air the number and nature of Air Ministry establishments in Wales?

Sir S. Hoare: There is one Air Ministry establishment in Wales; it is a flying training school.

New Airships

CAPTAIN GARRO-JONES asked the Secretary of State for Air what progress has now been made in the construction of the two new airships?

Sir S. Hoare: Actual construction of either airship has not as yet been commenced. A large volume of investigation and other preliminary work has, however, been carried out.

Fighting Services Expenditure

MR. T. THOMSON asked the Financial Secretary to the Treasury the comparable figures showing the gross expenditure on the Navy, Army, and Air Force for the years 1913-14 and 1922, 1923, 1924, and 1925?

Mr. Guinness: The following are the figures:—

	Navy.	Army.	Air Force.
1913-14	£50,213,450	£31,320,397	* £1,375,700
1922-23	£65,403,954	£66,001,075	£14,585,271
1923-24	£59,201,586	£55,532,359	£16,635,706
1924-25 (Estimated)	£60,729,250	£54,480,000	£19,074,000
1925-26 (Estimated)	£64,363,460	£54,333,000	£21,319,300

* £605,700 charged to Navy Votes and £770,000 charged to Army Votes.

The Italian Flight to Australia

COL. M. DI PINEDO, Chief of Air Staff in Italy, who is making a big aerial tour on a Savoia S.16 ter flying-boat, and who reached Charbar last week, had the misfortune to

Iraq Bombing Operations

LIEUT.-COMMANDER KENWORTHY on April 30 asked the Secretary of State for Air how many times the Royal Air Force has been in action during the present year; what were the casualties suffered; if there is any estimate of the casualties inflicted; and whether on all occasions warning is given before dwellings are bombed in order that non-combatants may be moved to a place of safety?

Major Sir Philip Sassoon: The answer to the first part of the question is five times; to the second, two casualties; to the third, that as in at least one case the bombing supervened on inter-tribal fighting and the casualties due to the one cause or the other could not be distinguished, no estimate under this head can usefully be given; to the last part of the question, that explicit warnings were given in all cases, except where the air action was taken in defence of Iraqi tribesmen who were being raided by invading and looting tribesmen.

Lieut.-Commander Kenworthy: In the latter case were any dwelling houses bombed? I am not asking the tribes that were attacked in the field, but whether any dwellings were bombed?

Sir P. Sassoon: The latter case applies to invading tribes coming from a great distance and having to be dealt with summarily many hundreds of miles from their homes.

Lieut.-Commander Kenworthy: My question refers to dwellings being bombed. Is it a fact that in all circumstances warning was given before dwellings were bombed?

Sir P. Sassoon: Yes.

Airship R. 33

SIR H. BRITAIN asked the Secretary of State for Air whether he can see his way to suggest that some special mark of recognition be awarded to Flight-Lieut. Booth for the efforts of himself and his crew which resulted in the successful return of the R. 33 to Pulham?

Sir P. Sassoon: I assume that my right hon. friend will in any case be considering this matter on his return.

Sir H. Brittain: Will the hon. and gallant gentleman do all he can to suggest that some really tangible recognition should be given not only to the lieut.-commander but to the entire personnel for the splendid British exploit which has thrilled this country and the whole world?

Sir P. Sassoon: I will tell my right hon. friend.

Mr. Wells asked the Secretary of State for Air if he can state the cause of the accident to the Airship R. 33; and, if so, what steps are being taken to minimise accidents of this nature in the future?

Sir P. Sassoon: An inquiry is at present being held into the cause of the accident, and until the investigating committee has reported, I am unable to make any statement on the subject.

damage his machine when attempting to resume his flight on May 2. The damage was slight, however, and he made a fresh start on May 5 and landed that afternoon in Karachi Harbour.

AIR MINISTRY NOTICES

NOTICE TO AIRMEN

Index, April 29, 1925

It is notified that the Index dated November 8, 1924, is cancelled and a new one issued as above, giving list of Cancelled Notices, Operative Notices and General Notices, including all foreign regulations, etc.

NOTICE TO GROUND ENGINEERS

Index

It is notified in No. 3 of 1925, that the following Notices to Ground Engineers are cancelled:—

1920.—Nos. 2, 6, 7, 13 and 17.
1921.—No. 10.
1922.—Nos. 5 and 9.

Operative Notices

THE Notices to Ground Engineers remaining in force at this date are listed in Notice No. 3 of 1925.

Ground Engineers and others in possession of the Notices should check their sets and, if they find them to be incomplete, should apply for the Notices which are missing to:—The Secretary (D.D.A.T.), Air Ministry, Kingsway, London, W.C.2.

No. 3 of 1925.

A NEW ROLLS-ROYCE CAR

CONSIDERABLE interest attaches to the introduction, by Rolls-Royce, Ltd., of a new 40-50 h.p. car chassis which has an entirely new overhead valve engine. This chassis, so far as the transmission of the power from the clutch to the back axle is concerned, is exactly similar to the "Silver Ghost" model (also of 40-50 h.p.), which has been the standing construction of the famous Derby firm for many years. It is to be known as the "New Phantom" model.

The four cylinders are arranged in two blocks of three cylinders, with a single detachable combustion head, which carries the rocker-operated inverted valves, the rockers being oscillated by enclosed vertical push-rods lifted by plungers from the enclosed side camshaft driven by helical toothed gearing.

The bore of the cylinders is $4\frac{1}{4}$ ins. and the piston travel $5\frac{1}{2}$ ins., as against a bore and stroke of $4\frac{1}{2}$ ins. and $4\frac{3}{4}$ ins., respectively, of the "Silver Ghost" model. The volume swept of the new model is 7,668 c.c., as against 7,410 c.c.

The transmission of the power to the standard type of Rolls-Royce gear-box and rear transmission is by a new single-plate clutch running dry and a Hardy type disc universal joint between the clutch-driven shaft and the primary shaft of the gear set. The ignition is dual by Watford magneto, and by battery and coil and accumulator. A separate set of plugs are used for each ignition.

The lubrication is by a submerged gear pump, which forces oil to the main and subsidiary bearings of the engine. It operates through a three-way reducing distributor, which allows of the oil at full pressure being forced to the crank-shaft and big ends. The electrical installation works at 12 volts pressure and, like the ignition, is of Rolls-Royce manufacture and design.

With four-wheel brakes, shock-absorbers, detachable wire wheels with Dunlop straight-sided cord tyres, 33 ins. by 5 ins., and a wheel-base of 12 ft. and a track of 4 ft. 8 ins., the complete chassis costs £1,850. Orders are being taken now, and deliveries will commence in 14 weeks' time. The makers are Rolls-Royce, Ltd., of Derby, and the new chassis can be seen at the company's showrooms at 15, Conduit Street, London, W.1.

British Engines in Germany

It is gratifying to note that in the forthcoming big German competition, the Deutscher Rundflug, British engines will be well represented. At least five of the entries amongst the higher-powered aircraft are fitted with Bristol "Lucifer" engines, whilst in the lower categories there will be found A.B.C., Blackburne, and Douglas engines fitted to many of the entries.

Inst. Aeronautical Engineers

WE would remind our readers that the last meeting of the current session of the Institute of Aeronautical Engineers will take place at the Engineers' Club, Coventry Street, London, W.1, on May 8, at 6.30 p.m., when Capt. W. H. Sayers will read a paper on "Lessons of 1924."

R.A.F. Wins Chadwick Prize

THE Chadwick Trustees announce that the prize of £100 and the gold medal for "specially assisting in promoting the health of the men" of the Service to which he belongs has been awarded to Wing-Commander Harold E. Whittingham, R.A.F.M.S., who "by his work on sand-fly fever has done

more than any other officer in recent years to promote the health of the men of the Royal Air Force." The award is made once in five years to a medical officer of one of the Services.

Air Services Across Germany

LIEUTENANT-COLONEL EDWARDS, Deputy-Director of the Air Transport Department, and Mr. F. G. L. Bertram, Principal of the Civil Aviation Department of the British Air Ministry, will return to London on Monday, their negotiations with the German Ministry of Communications on matters relating to air traffic having led to satisfactory results. It is stated also that the air service between Britain and Germany will be continued in the future.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (London Aero-Models Association)

COMPETITIONS for the *Model Engineer* No. 1 Challenge Cup and the Western Challenge Cup, both of which are open to all, will be held at Sudbury on Saturday, May 16, at 3.30 p.m.

Entrants should notify the Competition Secretary, Mr. B. K. Johnson, of 46, Norton Road, Wembley, Middlesex, at the earliest possible moment.

A. E. JONES, Hon. Secretary

SIDE-WIND

THERE are not many aviation events—no matter in what part of the world they happen—in which the famous Shell spirit does not play an important part. For instance, we learn that this fuel has been selected for the recently formed air mail service between Cape Town and Durban, which cuts down the time between these two points from 48 to 8 hours. Incidentally, it may be of interest to note that Shell-Mex, Ltd., supplied the lubricating oil (Shell "All's Well") to His Majesty's yacht *Victoria and Albert* at Genoa on the occasion of His Majesty's recent cruise.

PUBLICATIONS RECEIVED

Technical Notes: No. 213.—Discharge Characteristics of a High-Speed Fuel-Injection Engine. By R. Matthews. February, 1925. No. 214.—Note on the Katzmayr Effect on Airfoil Drag. By S. Ober. February, 1925. No. 215. The Calculation of Wing Float Displacement in Single-Float Seaplanes. By E. P. Warner. March, 1925. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Catalogues

Calcolo della Navicella e degli Organi Accessori nei Dirigibili Supplemento ai Rendiconti Tecnici. By Ing. R. Verduzio. Direzione Superiore del Genio e delle Costruzioni Aeronautiche. Viale Giulio Cesare, Rome.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.e. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1923.

Published May 7, 1925.
30,857. H. LEITNER. Screw propellers. (231,919.)

APPLIED FOR IN 1924.

Published May 7, 1925.
11,875. T. WHITING. Wire strainer. (232,052.)

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